VOL. LXXIX PART FIVE

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

MAY 1954

PAGE

The Secretary's Page 197

Arrangements for Chelsea Show, 1954 199

Notes from Wisley. By J. B. PATON 202

Annual and Biennial Flowers. By A. P. BALFOUR, F.L.S., V.M.H. *Illustrated* 205

Plants and Problems—V 216

The Meaning of Soil Acidity. By WALTER HEYDECKER . 221

NOTES FROM FELLOWS:

A note on *Arum creticum*. By MARK OGILVIE-GRANT 231

WISLEY TRIALS, 1953:

Linaria 232

Petunias 232

Endive 233

Golden Self-Blanching Celery 234

Plants to which Awards have been made in 1953 . . 235

Book Notes 239

★

VINCENT SQUARE, LONDON, S.W.1

. . . for those who take

PRIDE

in their

garden!

Trimmer

Tarpen Electric Garden Tools are essential for preserving the charming and well-tended appearance of your garden and save hours of endless drudgery.

TARPEN TRIMMER

Ten times faster than hand shears, the electrically driven Tarpen Trimmer can save its cost in two days' use, keeping your hedges neat and healthy. Safe and easy to use, easily handled by man or woman.

Price, including 25 ft. cable, from £16.

Grassmaster

TARPEN GRASSMASTER

Cuts the toughest grass and weed growth inaccessible to scythes and mowers, saves hours of hard and unpleasant labour. The Grassmaster can also be easily converted into the Vergemaster (see below) at the additional cost of £4.

Price, including 25 ft. cable, from £12.

New 3-wheeled attachment which enables the machine to be pushed to and fro like a carpet sweeper £3 17s. 6d.

Vergemaster

TARPEN VERGEMASTER

Takes the backache out of trimming lawn edges. Simple to use, the Vergemaster is mounted on two rollers and is drawn backwards along the edge of the turf, cutting as fast as you can walk. The machine can be converted into the Grassmaster at the additional cost of £1.

Price, including 25 ft. cable, from £18

Power supplied by mains, car battery or portable generator

Write for illustrated folder

TARPEN ENGINEERING CO LTD

7 IXWORTH HOUSE, IXWORTH PLACE, LONDON, S.W.3

Tel.: KENsington 3491 (7 lines)

The science of plant protection

A friend in need

We have many friends in other lands who need food. And there are many more people who would be our friends if we could only show them the way to a world of plenty. Every year the world's food crops are ravaged by insect pests, weeds and diseases — we lose the equivalent of America's entire agricultural production in this way. Preventing this waste is the business of Plant Protection Ltd — backed by the immense research resources of their parent company, I.C.I. These resources and Plant Protection's own research station at Fernhurst stand behind every 'P.P.' product.

This research has given our world the first selective weedkillers (produced for the gardener as 'Verdone'), insecticidal seed dressings and the famous insecticide, gamma-BHC (available to gardeners as 'Sybol'). To the world, plant protection means more food from the same amount of land. To the gardener, it means better, lovelier gardens with less disappointment and less drudgery.

Plant Protection Ltd

HARDY WATER LILIES

For 6 to 12 inches of Water

CANDIDA, white	12/6
LAYDEKERI FULGENS, carmine	12/6
LAYDEKERI LILACEA, rose-lilac	10/6

For 12 to 18 inches of Water

ALBATROSS, white	12/6
WILLIAM SHAW, shell pink	17/6
FLAMMEA, wine red	7/6

For 12 to 24 inches of Water

CHROMATELLA, yellow	12/6
JAMES BRYDON, rosy carmine	15/-
WM. FALCONER, darkest red	17/6

For 18 to 36 inches of Water

GLADSTONIANA, white	10/6
MRS. RICHMOND, deep pink	17/6
ESCARBOUCLE, glowing red	17/6

Early planting ensures free flowering. Order now for delivery end May/early June.

ORDERS value 50/- and over carriage free for cash with order. Under 50/- please add 2/- in the £1, minimum 1/6.

Our descriptive list of Water Lilies and Aquatic Plants is freely available on request.

STEWARTS NURSERIES
FERNDOWN Est. 1742 DORSET

By Appointment Suppliers of Horticultural Chemicals to the late King George VI.

JOSEPH BENTLEY LIMITED

HORTICULTURAL SPECIALISTS

BARROW-ON-HUMBER, LINCS.

BENTLEY'S
CHRYSANTHEMUM
CARNATION, SWEET PEA
ROSE, DAHLIA
and
TOMATO FERTILISERS
ARE WORLD FAMOUS

SEND FOR 88 PAGE ILLUSTRATED CATALOGUE POST FREE ON REQUEST

LORD WOLMER'S FRUIT TREES

These trees have been known for many years for their outstanding quality and reliability and are all grown on correct rootstocks.

APPLES	PEARS
PLUMS	PEACHES
CHERRIES	NECTARINES

SOFT FRUITS

also BEECHES for Hedging.

Catalogue with much useful information FREE on application to :—

FRUIT NURSERY DEPT. (J.R.H.),
BLACKMOOR ESTATE, LTD.
LISS, HANTS.

FOR SALE

WATERMOUTH CASTLE GARDENS

Comprising about two acres Italian style walled and terraced gardens, beautifully situated in valley sloping south, flagged walks, natural waterfall, tropical shrubs. **£1,500,** or offer

Also, as one lot with the above, or separate:—
Modernised four bedroomed stone Cottage, enjoying fine view (photo available) of gardens and North Devon coast and sea. Half acre walled garden. **£3,250**

About 2,500 sq. ft. Glasshouses with stone built potting shed and storehouse. Half acre walled boundary. **£1,000,** or offer

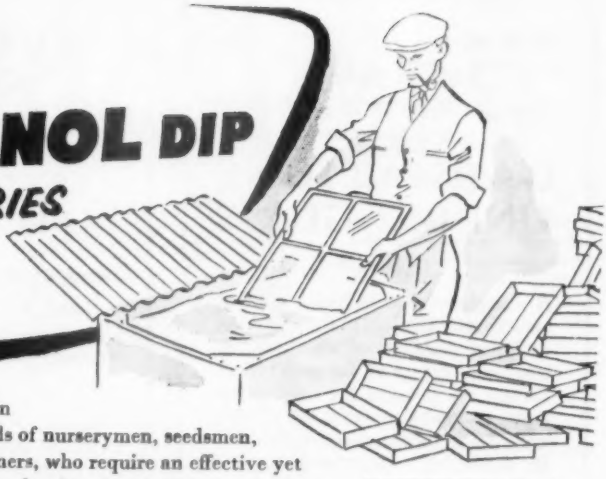
About three and a half acres Smallholding, suitable for early flowers and strawberries, etc. **£750**

One acre Building Plot with unexcelled views of sea and coast. **£750**

For further details of this wonderfully situated, sheltered, and warm valley property, write:

SINGLETON
Watermouth, Ilfracombe. Phone: Ilf. 636

NEW! CUPRINOL DIP FOR NURSERIES



Cuprinol 'Dip' has been produced to meet the needs of nurserymen, seedsmen, growers and market gardeners, who require an effective yet inexpensive wood preserver for *dipping* seedboxes, stakes, canes and other timber. It preserves these articles from Decay or Boring Insects and avoids the heavy costs of frequent replacements. Cuprinol 'Dip' is harmless to plants and once dry can be safely used in contact with them. Available in barrels or special 5 gallon drums and obtainable through your usual horticultural sundriesman.

CUPRINOL LTD., 33 BRUTON ST., LONDON, W.1

The GARDEN SHEAR of the FUTURE!

W.412

A revolution in Garden Shear design, fitted with RUST-RESISTING blades. Hollow Forged, combining strength with lightness. The Floating Bearing gives a smooth, easy action. Using no spring, it offers a long wearing life and is adjustable when necessary. Designed for normal body movement and ease of cutting. Patent applied for.

Write for illustrated leaflet T1.

—and you'll also want this

W.417 PRICE 50/-

LONG-HANDLED EDGING SHEAR

30/-

WILKINSON SWORD

THE WILKINSON SWORD CO. LTD., LONDON, W.4

In the press

A New Bulletin
from the Ministry of Agriculture
and Fisheries

CARNATIONS UNDER GLASS

(No. 151)

A handbook describing modern carnation cultivation in the specially-designed glasshouses which carnations can occupy all the year round. Details are given of the new soilless culture, suitable varieties are named, and advice given on preparing blooms for marketing. Illustrated.

Price 3s. By post 3s. 2d.

H.M. STATIONERY OFFICE

York House, Kingsway, London, W.C.2; 423 Oxford Street, London, W.1. (Post Orders: P.O. Box 569, London, S.E.1); 13a Castle Street, Edinburgh 2; 39 King Street, Manchester 2; 2 Edmund Street, Birmingham 3; 1 St. Andrew's Crescent, Cardiff; Tower Lane, Bristol 1; 80 Chichester Street, Belfast, or through any bookseller.

RUSSELL'S

EXHIBITS AT CHELSEA SHOW MAY 25th to 28th

ORNAMENTAL TREES, SHRUBS and CLIMBING PLANTS

See our display of these in their informal planting in the Gardens Avenue.

FUCHSIAS

A choice selection in Standard, Pyramid and Bush forms are exhibited (on stand No. 3B) in the Grand Marquee.

Our representatives will be in attendance to give advice and guidance and from whom catalogues, listing the plants exhibited, can be obtained.

L. R. RUSSELL, LTD.
RICHMOND NURSERIES, WINDLESHAM, SURREY

GARDEN WITHOUT TEARS

BY MACHINE

FULLEST DETAILS OF GARDEN MACHINERY FREE ON REQUEST

FARMFITTERS LTD. (U)
GERRARDS CROSS, BUCKS.
THE GARDEN MACHINERY PEOPLE

THERE IS ONLY ONE GENUINE ORIGINAL

STRAWBMAT

and we make it—so

IMAGINE THIS IS A STRAWBERRY

It is unblemished by slugs or grit. You can always pick fruit like this if only you will use **STRAWBMATS** instead of loose, untidy straw. You will also get them earlier. Why not **CHEAT THE SLUGS** and trap the sun's heat? As recommended by Adam the Gardener, see *Sunday Express* 20/5/51, and Mr. Middleton's Gardening Guide, and as supplied to the Country Gentlemen's Association.

NOTHING CHEAPER CAN BE BOUGHT
NOTHING BETTER CAN BE GOT

Preferably obtain from your local dealer:

27/- for 36 12" mats.
36/- for 36 18" mats.
54/- for 36 21" mats.
72/- for 36 24" mats.

BEWARE OF IMITATIONS

OR, if time does not press, send S.A.E. for our beautiful folder* to :—

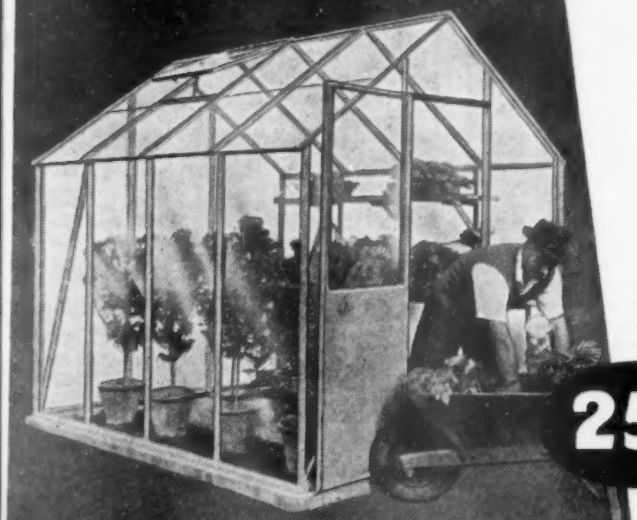
Strawberry Protection Company, 52, Lanivet, Bodmin, Cornwall

London Showrooms: 52, "The Cornish Jungle," 228, Strand, W.C.2. *Tel.: Cen.* 8195

* After seeing this you will realise the advantages of Strawbmats in a flash—they should last you for five years!

The new CRITTALL "CADET"

RUSTLESS GREENHOUSE



An easily erected greenhouse for gardens where there is not room for the Crittall extensible house. The "Cadet" is made from heavy rolled steel sections electrically welded and completely *rust-proofed by Hot-dip Galvanizing.* Can be seen at leading London Stores and at Agents throughout the country.

Complete with glass, putty, glazing clips and foundation lugs.

Delivered free by road in England and Wales.

25 *gns*

Full details from :—
THE CRITTALL MANUFACTURING CO. LIMITED
Horticultural Department C,
Braintree, Essex.

LIQUINURE
LIQUID MANURE

A perfectly balanced Plant Food in 3 types—**General, Tomato Special, and Flower Special.**

Sold everywhere in 1/9 and 3/6 bottles.

Also half gall. 13/6 carr. paid.

128 page fully illustrated book, "Liquid Manure Gardening," 1/3 post free from :

LIQUINURE SALES
BOREHAM WOOD, Herts.

THE ASTOR SHEARS

This ingenious invention works on the scissor principle. All four knives cut both ways, thus covering a much larger surface in a given time than ordinary shears, while making a straighter, cleaner cut with less effort. Easily sharpened.

Price 35/-

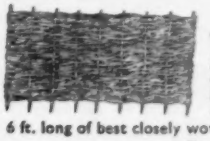
THE "FLEXA" MOWER

Different in construction from other mowers, the shear blade and the cutting knives of the Flexa are made of thin steel strips which allow flexibility in operation. Having a "shaving" cut, the Flexa does not "pull" the grass, and will cut it easily when wet, rough, or as high as 10". Very easy to push.

Used in Wisley Gardens for many years.

Please write for particulars to :—

The FLEXA Lawn Mower Co. Ltd.
Guildford Road, Woking, Surrey.



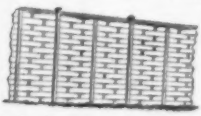
TOP GRADE WATTLE HURDLES

3 ft. high	..	12/-
4 ft. high	..	16/-
5 ft. high	..	21/-
6 ft. high	..	25/6

6 ft. long of best closely woven hazel or willow.

CLOSE BOARD FENCING

3 ft. high	..	28/-
4 ft. high	..	34/-
5 ft. high	..	42/-
6 ft. high	..	47/-



DURABLE INTER-WOVEN FENCING

3 ft. high	..	23/-
4 ft. high	..	28/-
5 ft. high	..	34/-
6 ft. high	..	39/-

6 ft. long panels strongly made of oak or selected hardwoods and creosoted.

Immediate Despatch. All prices C.W.O.
Carriage paid England and Wales.

Also SUPERLAP INTERWOVEN FENCING

The horizontal slats OVERLAP making a 1st class 'peep-proof' and extra rigid fence.

CHESTNUT FENCING, GARDEN GATES, GREENHOUSES, SHEDS, etc.

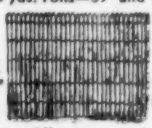
Write for Free Lists.

VALE COUNTRY PRODUCTS
(Dept. R.H.S.) WANTAGE, BERKS

"RIVIERA" SCREENING

is split ¾" dia. bamboo bound nearly close by galv'd wires in 10 yds. rolls—59" and 49" wide.

IDEAL FOR SHADE/FROST, GREENHOUSES, FRAMES, ETC.



SIGHT PROOFING OPEN WIRE OR IRON FENCES, ETC.

Fencing & Gates. All types, supplied and fixed. Oak Pale Panels, Wovenwood, Hazel & Osier Hurdles, Chestnut Fencing, Teak Garden Furniture

GERALD GILMER LTD.
TEL.: 1640/1 **LEWES** EST. 1922
And at BISHOP'S WALTHAM. Tel.: 271

GARDEN STONE

for PAVING, ROCKERY & WALLING

All descriptions available. Inspection invited
Price List on application

FITZPATRICKS

STONE MERCHANTS

455 OLD FORD ROAD, LONDON, E.3
Telephone : ADVance 2991

JUSTIN BROOKE LTD.

WICKHAMBROOK, Nr. NEWMARKET, SUFFOLK

We invite you to visit our nurseries and fruiting orchards at any time, including Sundays—preferably by appointment.

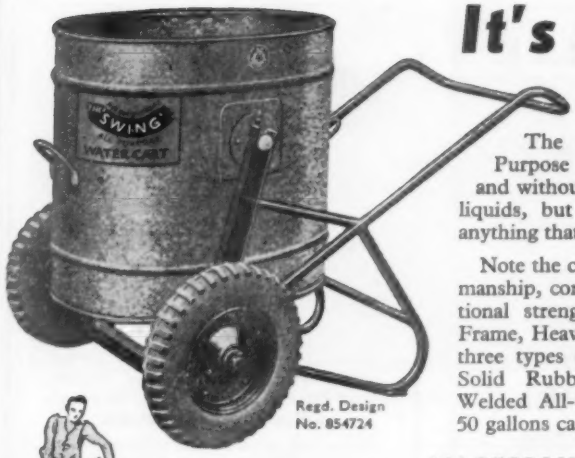
We have a large acreage of nursery stock, including Peaches, Nectarines, Apricots, Cherries, Apples, Pears, Plums and Figs.

In our fruiting orchards you can see the results obtained by planting similar stocks of all these fruits ; and you can see the results at various stages of growth.

PEACHES ON PEACH STOCK

Telephone :
In office hours—Wickhambrook 200 **Out of office hours—Wickhambrook 304**

It's so easy!



Regd. Design No. 854724

The new improved SWING All-Purpose Water Cart conveys easily, and without splashing or waste, not only liquids, but fertilisers, manure—in fact, anything that can be put into the container.

Note the clever design and sturdy workmanship, combining lightness with exceptional strength. Welded Tubular Steel Frame, Heavily Galvanised Container and three types of wheel—Pneumatic Tyred, Solid Rubber Tyred or Unbreakable Welded All-Steel. Six sizes from 15 to 50 gallons capacity.

Easy to tip

The New Improved

'SWING'

ALL-PURPOSE WATER CART

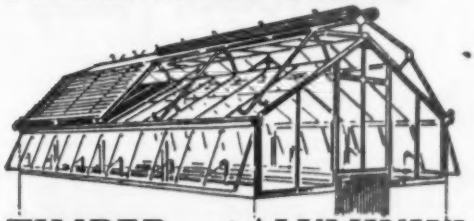
STOCKED BY GEO. MONRO, CARTER'S, SUTTON'S AND ALL GOOD HORTICULTURAL SUNDRIESMEN.

Alfred Allen
& SON LIMITED
LOWER GORNAL, Nr DUDLEY

London Office:
23 LAWRENCE LANE, E.C.2. *Tel: MONarch 2978*

A933

RICHARDSON



TIMBER and ALUMINIUM

GREENHOUSES

STOCK MODELS
or any special designs

★

Richardson Greenhouses supplied for Royal Horticultural Society's gardens at Wisley

★

WOOD LATH AND OTHER GREENHOUSE BLINDS SUPPLIED TO ORDER

Complete Maintenance Service
(available any district)

Boilers supplied. Heating systems overhauled, repaired, remodelled. General repairs, painting, glazing etc.

Estimates free.

W. RICHARDSON
& CO. LIMITED
NEASHAM RD., DARLINGTON

London Office: **117 Victoria Street, S.W.1.**

Associated Firms:
J. WEEKS & Co. (Chelsea). JAMES GRAY (Chelsea).
SIMPSON & FARMER (Glasgow).

HORTICULTURAL and HEATING ENGINEERS. Established 80 years.

LEONARDSLEE
HORSHAM

SIR GILES LODER, BT.

will open the Garden on

SAT.	**MAY 8th**
WED.	**MAY 12th**
THURS.	**MAY 13th**
SAT.	**MAY 15th**
WED.	**MAY 19th**
THURS.	**MAY 20th**
SAT.	**MAY 22nd**
THURS.	**MAY 27th**
SAT.	**MAY 29th**

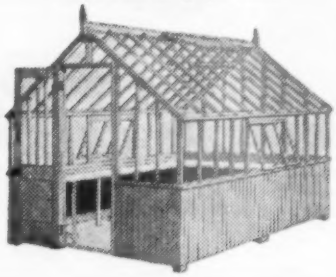
Admission **1/6**

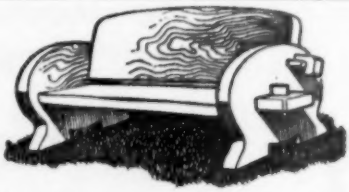
Car Park **1/-** Tea

FREDERICKS PORTABLE BUILDINGS LIMITED (H) BEACONSFIELD, BUCKS.

Tel. Beaconsfield 851

Ask for our free Catalogue for Garden Sheds, Greenhouses, Summer Houses, Loose-boxes, Garages and Buildings suitable for Staff Quarters.





We specialise in Garden Furniture and Portable Buildings of distinction and quality.

Leaflet on request

W. STANMORE

Garden Furniture Manufacturer & Portable Building Works

WATLINGTON, Oxon.

Watlington 77

STOCKS, EVERY ONE A DOUBLE

This wonderful new strain of ten-week stocks at last makes it possible to plant a bed with confidence that everyone will be double.

A customer writes:—

Thank you very much for your lovely double Stocks. Of the 250 plants sent every one has made a splendid plant and there is not a single one amongst them.—Kettering, July, 1953.

We offer the following colours:—**Dark Blue, Dark Red, White and Apricot-Pink,** also mixed **3/6** per doz., **24/-** per 100.

Postage, 1/- doz., 2/- 100

YOUNG PLANTS AT HALF PRICE

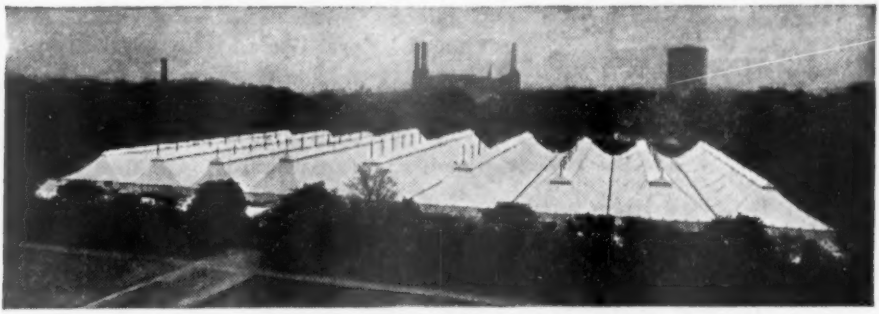
During the summer we shall have a large stock of young plants of Primulas, Gentians, Delphiniums, Phlox, Lupins and many other Alpines and hardy plants, which we can supply at half our usual price for grown plants of the same varieties. These young plants are exactly the same as those we shall ourselves grow on and for which full retail prices will be charged in the autumn and the following spring. Send 1½d. for List.

H. G. & P. M. LYALL,

Bricket Wood, Watford, Herts.

Garston (Watford) 2098

The Largest Marquee in the World!



Erected at the Chelsea Flower Show 1951–1953 by PIGGOTT BROTHERS & CO. LTD.

The supply and erection of a marquee such as the one illustrated calls for specialised knowledge and extensive experience. Piggotts have been experts in these matters for over 170 years. Whatever you require—a large marquee or a small tent for a social function—you will find that Piggotts are the best people to provide this service

PIGGOTT BROTHERS & CO LTD

Established 1780

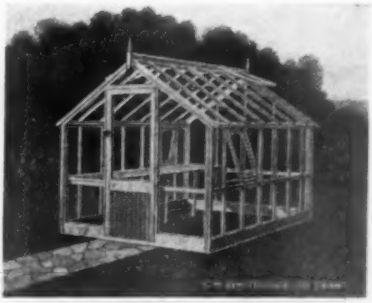
220–226 BISHOPSGATE, LONDON, E.C.2

BIShopsgate 4851 (9 lines)

C. H. WHITEHOUSE, LTD.

'Phone: FRANT 247

Buckhurst Works, FRANT, Sussex



THE PREMIER
Greenhouse

See our exhibit at Chelsea (Stand No. 14)

Specially designed for the Chrysanthemum enthusiast and others who require a low-priced greenhouse with glass to near ground level.

Sizes:— 8 ft. × 6 ft.
10 ft. × 7 ft.
12 ft. × 8 ft.

In Six complete sections—Simple to erect

Constructed of Western Red Cedar

Painting Unnecessary - Low in Upkeep Costs

New Fully Illustrated Catalogue Free on Application

'You can see now, sir, why I asked for a Qualcast Royal Blade motor mower'

You feel lawn-proud after using a Qualcast Royal Blade. The Royal Blade is the dependable machine you need for consistently good mowing. It's easy on fuel (you can reckon it takes less than 1½ pints to cut 2,000 square yards). The steel roller keeps your lawn looking like a billiard table. The cutting is done by six 16" Sheffield steel blades, which sharpen as they work and cut finely and evenly down to a close-cropped quarter-inch. *There are Service Stations in all principal towns.*

Qualcast

ROYAL BLADE

16" MOTOR MOWER

Cuts edges and borders

Guaranteed 3 years

£48-7-4 *TAX PAID* **or a down payment and then by easy stages**

FREE: On lawns, cricket grounds, tennis courts, you can keep things trim with a Qualcast Royal Blade. Send today for the free Qualcast Booklet 'Z' which is full of useful information.

QUALCAST LIMITED, DERBY

JOURNAL OF THE ROYAL HORTICULTURAL SOCIETY

VOL. LXXIX PART FIVE

May 1954

THE SECRETARY'S PAGE

ANNOUNCEMENTS—MAY AND JUNE

Shows

TUESDAY, May 4 12.30 P.M. to 6 P.M. WEDNESDAY, May 5 10 A.M. to 5 P.M.	Rhododendron Show.
TUESDAY, May 25 to FRIDAY, May 28	Chelsea Show.

For details see pp. 199–201.

THURSDAY, June 3 12 NOON to 6 P.M. FRIDAY, June 4 10 A.M. to 5 P.M.	British Iris Society's Show.
TUESDAY, June 15 12 NOON to 6 P.M. WEDNESDAY, June 16 10 A.M. to 5 P.M.	Fortnightly Show. Flowering Tree and Shrub Competition. Cactus and Succulent Competition for Amateurs (Sherman Hoyt Trophy). British National Carnation Society's Pink Competition.
TUESDAY, June 29 12 NOON to 6 P.M. WEDNESDAY, June 30 10 A.M. to 5 P.M.	Fortnightly Show. British Delphinium Society's Show. Cactus and Succulent Society's Competition. Geranium Society's Competition.

Lectures

TUESDAY, May 4, at 3 P.M. "Dwarf Rhododendrons suitable for Rock Gardens" by MR. J. P. C. RUSSELL.

TUESDAY, June 15, at 3 P.M. "The Construction and Planting of a Rock Garden on the Gardone Riviera in Italy" by DR. A. HRUSKA.

TUESDAY, June 29, at 3 P.M. "Dwarf Shrubs, other than Ericaceous Plants and Conifers" by MR. H. G. HILLIER.

Demonstrations—The following demonstrations will be given at Wisley, that on the second day being in each case a repetition of that given on the first.

Vegetable Garden

May 5–6. Thinning, Transplanting and Successional Cropping. (Commencing at 2 P.M.)

Flower Garden

May 19–20. The Summer Pruning of Shrubs. (Commencing at 2 P.M.)

Fruit Garden

June 30–July 1. The Summer Pruning of Fruit Trees. (Commencing at 2 P.M.)

The London Floral Decoration Society—The London Floral Decoration Society announces that a Summer Exhibition of Flower Arrangements will be held in the Old Hall on June 22 and 23, 1954. Fellows' and Associates' tickets do not admit. Prices of admission: June 22, NOON to 5 P.M., 3*s.* 6*d.*; 5 P.M. to 8 P.M., 2*s.* 6*d.* June 23, 10 A.M. to 5 P.M., 2*s.* 6*d.*

14th International Horticultural Congress—The 14th International Horticultural Congress will be held at The Hague from August 29 to September 6, 1955.

The Society's Sesquicentenary—Attention is drawn to the arrangements for the Society's Sesquicentenary Celebrations in July, full details of which were given in the April issue of the JOURNAL. Any Fellow or Associate wishing to attend any of the functions for which a special ticket is required is requested to apply in accordance with the instructions given in that announcement. *The closing date for applications is May 15.*

Clematis Wilt—It is possible that some Fellows still experience the disappointment of seeing some of their Clematis plants suddenly wilting when making vigorous growth in spring. This "wilt" has been known for many years but the reason for it has not been determined. The symptoms are that the leaf blades hang downwards from the petioles in a very typical manner and the shoot does not recover although

new shoots may grow out from lower down the main stem. Specimens of wilted shoots are needed for examination at the Wisley Laboratory. Where a case occurs the owner is asked to remove the wilted shoot by cutting at a point some six inches or more below its junction with the main stem and to send this material to the Director, R.H.S. Gardens, Wisley, Ripley, Woking, Surrey.

Benmore—The Younger Botanic Garden. The Forestry Commission have reopened the Hostel at Benmore in Argyll for the convenience of small numbers of visitors to the Younger Botanic Garden. The facilities are available to Fellows of Scientific Societies and to the staff, graduates and students of universities who are interested in sylviculture or botany. The general charge is 31/- per day, which is inclusive of board, attendance and accommodation There is a specially reduced charge of 12/- per day for students sponsored by their professor. This latter charge does not include attendance. All intending visitors must make prior application in writing to the Education Officer, Benmore Forest School, Benmore, by Dunoon, Argyll.

ARRANGEMENTS FOR CHELSEA SHOW, 1954

Private View – There will be a Private View on Tuesday, May 25, between 2 P.M. and 8 P.M., open only to Fellows and Associates on surrender of the special detachable parts of their annual tickets. For details please refer to the paragraph relating to Fellows' and Associates' tickets below.

In no circumstances, by payment or otherwise, can extra admissions to the Private View be allowed.

Dates of Show – The Show will be held on Wednesday, Thursday and Friday, May 26, 27 and 28, in the grounds of the Royal Hospital, Chelsea, London, S.W. 3.

Times – Fellows and Associates

Fellows, Associates, and holders of Fellows' Transferable Tickets are admitted free of charge, on presentation of a current ticket, during the following periods:

Wednesday, May 26	8.30 A.M. to 8 P.M.
Thursday, May 27	8.30 A.M. to 8 P.M.
Friday, May 28	8.30 A.M. to 5 P.M.

The Public

Admission on payment may be obtained only during the following periods:

Wednesday, May 26	12 NOON to 8 P.M.	Admission	15*s.*
Thursday, May 27	8.30 A.M. to 8 P.M.	,,	7*s.* 6*d.*
Friday, May 28	8.30 A.M. to 12 NOON	,,	5*s.*
	12 NOON to 5 P.M.	,,	2*s.* 6*d.*

In no circumstances can admission be gained at any time on Tuesday, May 25, or before 12 noon on Wednesday, May 26.

Admission of Children – Children under five years of age cannot be admitted. The charge for the admission of children of five years and over will be the same as for adults.

Fellows' and Associates' Tickets – A Fellow subscribing 4 guineas annually receives 1 non-transferable and 5 transferable tickets. The non-transferable ticket has a *detachable* portion which will admit only the Fellow to whom it is issued and one companion to the Private View on May 25.
A Fellow subscribing 3 guineas annually receives 1 non-transferable and 2 transferable tickets. The non-transferable ticket has a *detachable* portion which will admit only the Fellow to whom it is issued and one companion to the Private View on May 25.

A Fellow subscribing 2 guineas annually receives 1 transferable ticket. This ticket has a *detachable* portion which will admit only the Fellow to whom it is issued to the Private View on May 25.

An Associate receives 1 non-transferable ticket. This ticket has a *detachable* portion which will admit only the Associate to whom it is issued to the Private View on May 25.

Each Fellow's ticket, whether non-transferable or transferable, will admit one person at any time when the Show is open on Wednesday, Thursday, and Friday, May 26, 27 and 28, but the non-transferable ticket may, of course, be used only by the Fellow to whom it is issued. An Associate's ticket may be used only by the Associate to whom it is issued.

Transferable tickets may not be left at the turnstiles for collection by persons visiting the Show later, but may be posted at the Post Office in Main Avenue.

Parties – No reduction in the price of admission can be made for parties of visitors, but tickets may be obtained beforehand to save trouble on arrival. Application, accompanied by a remittance to cover the cost of the tickets required, should be made to the Secretary, The Royal Horticultural Society, Vincent Square, London, S.W. 1, early in May. Such applications *must* reach the Secretary not later than by the first post on Friday, May 21.

Catering – It is regretted that it is not possible to provide set luncheons and teas, but buffets for the service of light refreshments will be available. There will also be separate enclosures for the service of alcoholic beverages.

Post Office & Telephones – A Post Office for the transaction of ordinary Post Office business will be found in Main Avenue, as will also several Public Telephone Boxes.

Railway Inquiries – British Railways have an inquiry bureau in the Show, situated in Main Avenue.

Band – The Band of H.M. Grenadier Guards will, by courtesy of the Officer Commanding, play each afternoon in the Ranelagh Gardens, where chairs are provided.

Cloakroom – A cloakroom at which bags, parcels, etc., may be deposited will be situated in Main Avenue.

Catalogue – An official Catalogue to the Show will be on sale in the Grounds, price 1*s.* 6*d.*

Invalid Chairs – The arrangements for the admission of invalid chairs will be as follows:

On Tuesday, May 25, Fellows and Associates in invalid chairs will be admitted between 2 P.M. and 8 P.M. on presentation of tickets for the Private View. There will be a charge of 5*s.* for each chair, and that charge will cover one attendant.

On Wednesday, May 26, no invalid chairs can be admitted.

On Thursday, May 27, invalid chairs will be admitted only between 8.30 A.M. and 12 NOON on presentation of Fellows' or Associates' tickets, or on payment of 7*s.* 6*d.* for the occupant of the chair. There will also be a charge of 5*s.* for the chair, and that charge will cover one attendant.

On Friday, May 28, invalid chairs will be admitted only between 8.30 A.M. and 12 NOON on presentation of Fellows' or Associates' tickets, or on payment of 5*s.* for the occupant of the chair. There will also be a charge of 5*s.* for the chair, and that charge will cover one attendant.

The Society cannot arrange for the provision of invalid chairs, but they may be hired from Messrs. Reselco Invalid Carriages Ltd., 262 King Street, London, W. 6.

TRANSPORT

Visitors travelling by car, taxi or coach should alight at the Embankment entrance. Visitors travelling to London will find the following Railway and Bus Services of London Transport operating from the Main Line Termini:

CANNON STREET (*Railway*). District Line direct to Sloane Square. (*Buses*) Number 13 to Charing Cross, thence by Number 11 to Lower Sloane Street, Pimlico Road.

CHARING CROSS (*Railway*). District Line direct to Sloane Square. (*Bus*) Number 11 to Lower Sloane Street, Pimlico Road.

EUSTON (*Railway*). Northern line to Charing Cross, thence by District Line to Sloane Square. (*Buses*) Number 68 or 188 to Strand (Aldwych), thence by Number 11 to Lower Sloane Street, Pimlico Road.

FENCHURCH STREET (*Railway*). District Line from Tower Hill direct to Sloane Square.

KING'S CROSS AND ST. PANCRAS (*Railway*). Piccadilly Line from King's Cross and St. Pancras to Leicester Square, thence by Northern Line to Charing Cross, thence by District Line to Sloane Square. Or Circle Line direct to Sloane Square. (*Buses*) Number 77 or 77A to Trafalgar Square, thence Number 11 or 39 to Lower Sloane Street, Pimlico Road.

LIVERPOOL STREET (*Railway*). Circle Line direct to Sloane Square. (*Bus*) Number 11 to Lower Sloane Street, Pimlico Road.

LONDON BRIDGE (*Buses*). Number 10 to Victoria, thence by Number 11, 39, or 46 to Lower Sloane Street, Pimlico Road.

MARYLEBONE (*Railway*). Bakerloo Line to Paddington, thence by Circle Line to Sloane Square.

PADDINGTON (*Railway*). Circle Line direct to Sloane Square. (*Buses*) Number 7, 7A, 15, 36 or 36A to Marble Arch, Park Lane, thence by Number 137 to Chelsea Bridge Road, Royal Hospital Road.

VICTORIA (*Railway*). District Line direct to Sloane Square. (*Buses*) Number 11, 39 or 46 to Lower Sloane Street, Pimlico Road.

WATERLOO (*Railway*). Northern or Bakerloo Line to Charing Cross, thence by District Line to Sloane Square. (*Bus*) Number 46 to Lower Sloane Street, Pimlico Road.

BAKER STREET (*Railway*). Circle Line direct to Sloane Square. (*Buses*) Number 2, 30 or 74 to Marble Arch, Park Lane, thence by Number 137 to Chelsea Bridge Road, Royal Hospital Road.

NOTES FROM WISLEY

J. B. Paton

Now that May is here it is to be hoped that we shall be favoured with fine weather so that the many beautiful shrubs and trees which flower during this month will be seen at their best. No family of plants has enriched our gardens with ornamental genera and species more than the family Rosaceae and this month we give consideration to some members of this important family.

The May-flowering Hawthorns, all members of the genus *Crataegus*, grow into small compact trees which also are notable for their brilliant autumn leaf colour and berries. For this reason many people prefer them to the Cherries which, though lovely in flower, for the most part have no second effect. The Thorns are not particular about the soil, doing equally well on a limy as on a lime-free one ; but they do require full sunlight if they are to give of their best both of flower and of fruit.

Our native Hawthorns, which flower about the middle of May in southern England, are usually considered to be two distinct species—*C. monogyna* and *C. Oxyacantha*. Both make small trees which can be attractive in the larger garden but are not so suitable for the average garden where it is better to grow improved forms such as Paul's Scarlet Thorn, *C. Oxyacantha coccinea plena*. This Thorn may be seen in Seven Acres where we have also observed a few of the North American species, of which over 1,000 have been described, including *C. macracantha* which is most heavily armed with spines up to 5 inches in length and which has fruits of bright crimson and *C. submollis* with slender 3-inch-long spines and orange-red fruits. *C. prunifolia* is considered to be one of the best Thorns for all-round effect having many white pink-anthered flowers carried in rounded clusters 2 to 3 inches across, fine coloured haws and rich autumn leaf colour. The origin of this Thorn is unknown but it is closely related to *C. macracantha* and some authorities consider it to be a hybrid between this species and *C. crus-galli*, the Cockspur Thorn of wide-spreading habit and long-persisting red fruits. There is no doubt about the hybrid nature of *C.* × *Carrierei*, sometimes known as *C.* × *Lavallei* and to be seen in the Award of Garden Merit Collection and in Seven Acres ; it is one of the late-flowering Thorns which produces corymbs of numerous white flowers towards the end of May to be followed by large orange-red fruits that persist well into winter.

Also producing handsome spring flowers and autumn fruits are the many ornamental Crab Apples that are now grown under the generic name of *Malus*, having been separated from the Linnean genus of *Pyrus*. Of those with white flowers we have noted the Chinese *M. hupehensis* in which the fragrant blossoms are tinged with rose and *M. Prattii* which is also very attractive especially in autumn with its coloured foliage and red or yellow white-speckled fruits. The popular Japanese *M. floribunda*, as its name suggests, is very free flowering and produces

many crimson buds which open to give pale pink flowers that gradually fade to white. The native and European Crab *M. pumila* which is the parent or part parent of a large number of the fruiting Apples of commerce has also given us some beautiful ornamental trees and of these the Siberian form *Niedzwetzkyana*, sometimes given specific rank, has been used in hybridizing to give such fine plants as *M.* × *Eleyi* with reddish-purple leaves and rich vinous-red fruits, *M.* × *Lemoinei* with profuse purplish-crimson flowers and bronze leaves and *M.* × *purpurea* with ruby-red blossoms that fade to purple. Other hybrids of *M. pumila* which should be noted are 'John Downie' with large yellow red-flushed fruits, 'Dartmouth' with plum-sized red-purple fruits and the rare 'Frettingham's Victoria' with yellow crimson-splashed fruits.

Of the shrubby members of this family the genus *Exochorda* provides some of the most beautiful white flowers for this time of the year. The Chinese *E. Giraldii*, introduced to England in 1909 by way of Germany and growing well on a good soil in a warm position, has eight to ten pure white flowers carried in erect racemes. It is closely allied to and possibly not specifically distinct from *E. racemosa* introduced from China in 1849 by FORTUNE. This latter has blooms so freely borne as to transform each branch into one large snow-white inflorescence ; it is little wonder that this plant has earned the common name of Pearl Bush. The Turkestan *E. Korolkowii* is very hardy, in most gardens hardier and more robust in habit than *E. racemosa*, but has slightly smaller flowers, while the hybrid between the two, *E.* × *macrantha*, originating at the nursery of Messrs. Lemoine, Nancy, is no less beautiful than its parents.

The shrubby Spiraeas are useful for providing bloom in the mixed border from March till July, some species even continuing the flowering period into September. *S. Thunbergii* begins the season in March with clusters of white flowers thickly set on twiggy arching branches, while in May *S.* × *Vanhouttei* on gracefully bent stems is opening numerous white blooms and *S.* × *arguta*, by many considered to be the best of the early-flowering Spiraeas, is carrying pure white blossoms in clusters of four to eight. The common name of the latter, Foam of May or Bridal Wreath, might aptly be given to these others as well. They can all be seen in Seven Acres as can the double white-flowered Japanese *S. prunifolia plena* (infinitely superior to the typical single-flowered form) which is notable also for its small glossy leaves which turn bright orange-red in autumn, and the Chinese *S. Sargentiana*, flowering at the end of the month or in early June and bearing its white flowers in dense rounded clusters.

Species to be noted for midsummer flowering are the erect-growing purplish-rose *S. Menziesii triumphans*, the dwarf-growing brilliant carmine *S. japonica* 'Anthony Waterer' and the scarlet-rose *S. Bumalda* which is more suited to the rock garden.

The genus *Prunus* provides numerous trees and shrubs for the garden both of ornamental and of economic value. The main flush of flower will be over at Wisley by the beginning of May but a few of the

later flowering Japanese Cherries may still be seen in the Cherry Field and on Weather Hill. The Cherry Field or Garden was planted in the winter of 1947–48 in order to make the collection of Cherries at Wisley more comprehensive. There are some 300 trees and they are now beginning to flower freely. Situated to the south of Battleston Hill the Cherry Garden is divided by two avenues ; that which runs north and south is composed of *P. yedoensis* and that which runs east and west is of 'Tai-Haku' (*P. serrulata tai-haku*). The Yoshino Cherry, *P. yedoensis*, will have dropped its pinkish white petals by May but the avenue of 'Tai-Haku' should be at its best with large single white flowers set off by the coppery-red young foliage. Of pink-flowered Japanese Cherries we may note the cyclamen-pink 'Fugenzo' (*P. serrulata fugenzo*), a broad-headed tree, and the well-known 'Kanzan' (*P. serrulata sekiyama*) of more upright habit and covered with deep cyclamen-pink blossoms. Of the white-flowered varieties 'Shirofugen' (*P. serrulata albo-rosea*) is very suitable for general planting. The buds are pink changing to white as they open as do those of 'Shimidsu Sakura' (*P. serrulata Shimidsuii*) also known as 'Oku Miyako.' This latter is one of the finest of Japanese Cherries, and has large double fimbriated flowers that hang in long-stalked clusters.

There is a fine plant of the Medlar, *Mespilus germanica* to be seen by the pond at the bottom of the Award of Garden Merit Collection. The flowers appear in May and the fruits may be gathered in late October when they are still green flattish apple-shaped and open at the top. Before they can be eaten they need to be bletted, that is stored until they have lost their green colour and the flesh has become soft. Storing is best done in a barrel containing sawdust.

The flowering Brambles, species of the genus *Rubus*, may not be so showy as most of the plants mentioned above but there is a certain delicacy about the flowers which makes some of them worthy of a place in the larger garden. One of the best is the American *R. deliciosus* which has its spineless branches covered with single rose-like white flowers. These flowers are carried on short twigs that arise from the previous year's branches. As the fruit is not delicious to the taste we must assume the name refers to the delight the flowers give to the eye.

R. odoratus, planted in Seven Acres, is another American plant, also without thorns, which has an extended flowering season lasting from June to September. The fragrant purple flowers are likewise borne on short stalks from the previous season's branches. This plant appreciates a more shaded position in which it will grow the stronger and in which the flowers, protected from the full sun, will last the longer.

Also of the family Rosaceae are genera such as *Sorbus*, *Cotoneaster* and *Aronia* that carry white corymbs of flowers in May but are mainly notable for the coloured fruits and leaves of autumn. We propose to discuss these later in the year. Next month we hope to continue our discussion on the family Rosaceae with a few notes on the species and hybrids of the Rose now to be seen at Wisley.

ANNUAL AND BIENNIAL FLOWERS

A. P. Balfour, F.L.S., V.M.H.

(*Lecture given on March* 16, 1954; DR. G. TAYLOR, D.SC., *in the Chair*)

I MUST express my appreciation of the honour the President and Council of The Royal Horticultural Society have done me in inviting me to talk to you on the subject of Annual and Biennial Flowers this afternoon. Although the main structure and indeed interest of most gardens must consist in the more permanent subjects such as trees, shrubs and lawns, in my opinion, no garden is making the fullest use of our horticultural ornamental resources without a representation of annual and biennial flowering plants. I propose to refer to the former from a horticultural standpoint, and to include all plants which will flower freely the first year from sowing, whether under glass or in the open. In the same way the term biennial will also include any plant which, sown one year, will be in full flower the next.

It is significant that it is the seeds of annuals which are first handled by most of us in our earliest years. In fact annuals may almost be described as the kindergarten or first steps in gardening. These are the plants whose seeds are usually given to us to grow in the first garden we ever possessed, carefully marked out and handed over by an encouraging father. Surely most of us too will remember the thrill of seeing the first tiny seedlings emerging from the dark inhospitable looking soil. This thrill is the possession of the true gardener, and is one fascination in the growing of annuals. Further, each plant we grow from seed is an entirely new creation with all the possibilities and excitement which that implies. Annuals too have something of the charm and exuberance of children, flowering with abandon and are usually of a light and graceful habit. Many flower the whole season through, and the more the flowers are cut the longer they remain in bloom. Another important advantage in annuals is that the great majority are remarkably free from the pests and diseases which afflict so many of our garden plants. This refers particularly to the dreaded virus diseases and may be owing to the fact of their being annually renewed from seed.

The uses of annuals in the garden are many, and it may be a suitable place to mention here that, in order to avoid the tiring repetition of names, I have compiled lists of annual and biennial flowers most suitable for various specific purposes in the garden. Here are the headings under which I have grouped them, and details will be given at the end of the paper.

Annuals for Cut Flowers.
Annuals for Autumn Sowing.
Annuals and Biennials for growing in Pots for Greenhouse and Conservatory.
Annuals for the Rock Garden.

Annual Climbing Plants.
Annuals for Window Boxes.
Annuals and Biennials for Formal Bedding.
Annuals for covering Rough Banks.
Annuals and Biennials for Partial Shade.
Hardy Biennials and Perennials from Seed for the Flower Border.

Should anyone wish to have a copy, or copies, of such lists, I shall be happy to send them by post on receipt of a stamped addressed envelope.

One of the best ways of using annuals in a garden is by planting them in a border or corner by themselves. This may be large with big clumps of each variety, as at Wisley, or simply a narrow border at the foot of a wall with quite small patches of individual subjects. One very apt position for such a border vividly comes to my mind. On my way to Wisley from Slough I have to pass a fine old Georgian farmhouse set back from the road. In front of it is a spacious lawn with borders of flowers under the house and on the two sides; facing the road is a deep wide ditch. The wide sloping bank of the ditch on the garden side is sown and planted each year with annual flowers. On the road side there is the usual grass verge. The gardener, whoever he or she may be, must be a clever one, as I have never known that border to fail and it is always a perfect picture for two to three months during the summer. The site is in my opinion ideal. Some such situation will occur in many gardens. I have known several other apt positions for such borders. One is in Berkshire where a side path from the house leads to a back entrance. On one side is a grass paddock in which are planted a few fruit trees, and on the other is a brick wall at the foot of which is a narrow border. This border is filled each year with small groups of annuals, and on the paddock side are a few odd beds down the side of the path, each one filled with an annual subject. This makes a very attractive feature in the garden, and gives great pleasure to the owner. Another position in a garden in Surrey, which attracted me, was made by that fertile gardening writer, MR. THEODORE STEPHENS, who helps us each week in *The Sunday Times* with his practical notes on gardening. At one time he made a garden round their new offices in a house on the outskirts of Guildford. This garden consisted of about an acre. On one side was a lawn with trees down the side of it, under which were planted Foxgloves and other shade-loving plants. On the other side of the lawn was a herbaceous border, and on the other side of that a path leading to the tool shed, compost heap and so on. Beyond the path was the vegetable garden; but before actually planting the vegetable garden proper MR. STEPHENS made a very attractive border of annual flowers, which created great interest among the visitors to the garden during their tenure. This is another admirable situation in my opinion for such a border. The main factors for success in making an annual border are, first choose an open sunny situation. The soil should be well drained and preferably on the light side. Dig the site thoroughly

in the late autumn or winter, throwing it up rough to catch the winter frosts and thaws to produce a good tilth for sowing in the spring. Incorporate, if possible, a good dressing of well-decayed farmyard manure or compost. The size of the patches of each subject should be in proportion to the width and length of the border, and should run into each other in an informal natural kind of way, rather as one sees patches of wild flowers along the roadsides. The same applies to the height of the subjects, the final effect should be undulating and completely informal, the arrangement being simple and as natural looking as possible. The choice of colour is a very wide one in annuals and must be arranged to taste, whether they be in strong and contrasting colours or in shades blending one into the other.

Another important use of annuals, and one which will be found essential in most flower gardens, is in forming an integral part of the flower or colour border. To get the fullest effect from a border devoted to flowering shrubs and perennial herbaceous plants, spaces should be left for annuals and biennials. These by their colour, freedom of flowering and habit of growth will more than double the floral effect of such a border. The great colour borders of earlier years, such as those at Littlecote, Hungerford, and Hampton Court, were laid down and maintained along such lines. Immense care can be devoted to, and great fun derived from, the creation of such a living colour picture. For those who have the interest and time, this can be a most satisfying and fascinating occupation. Many groups of annual plants such as Larkspur, Sweet Scabious, Marigold, *Godetia*, *Nemesia* and so on can be obtained in precise shades of colour coming true from seed, so that exact contrasts and blending can be accurately and unfailingly made. This is where the reward of the hard-working plant breeder comes in; when he finds his carefully bred creations confidently used in the making of such a garden picture.

The furnishing and decoration of the cool greenhouse is another important garden use of annual and biennial flowering plants. Many decorative subjects to flower at practically any time of the year can be easily and inexpensively produced by this means. With the help of a few frames, a cool greenhouse can be kept full of flowers solely by means of such plants easily and quickly raised from seed. For winter flowering there are excellent subjects such as *Primula malacoides*, *P. sinensis* and *P. obconica*; *Cyclamen* followed by *Cinerarias* and *Schizanthus* (Fig. 52); whereas in summer and autumn the choice is a very wide one, and in addition to the many well-known annuals such as *Nemesia*, *Viscaria* and *Dimorphotheca*, I suggest trials should be made of many others such as Swan River Daisy, which remains in flower for two to three months at a time, *Hunnemannia*, *Didiscus* and *Exacum*. All these plants grown in pots are also useful for decorating the home.

Most housewives to-day demand cut flowers for the decoration of the house. It is a mistake to cut into permanent plants, or to destroy the symmetry of a well-planted border. Therefore, during the summer

a few rows of suitable annuals grown specially for cutting for the house will be found invaluable. There are many good subjects for this purpose such as Larkspur, Stock, Tall Double Godetia, Sweet Scabious, Mignonette and many others.

The discussion of the growing of annuals for cut flowers presents a good opportunity to mention autumn sowing. Many hardy annuals in suitable situations give much better results when sown in the open ground in the autumn. The resulting plants flower two to three weeks earlier than spring sown, have longer flower stems, and make much more vigorous plants. I advise for, say, the southern part of England, sowing where the plants are to flower, from the end of August to the end of September according to circumstances. Choose an open well-drained situation. In the south of England at that time the land sometimes becomes extremely hard due to drought. Instead of laboriously trying to break up such land by fork or spade, simply wait for a shower and then cultivate the top 2 or 3 inches to get a tilth for sowing. This is quite sufficient and produces in most cases admirable results. The aim is to get plants to stand during the winter about 2 to 3 inches high with a rosette of leaves, large enough not to be lifted by frosts and thaws, and not so large as to be "winter proud." Many hardy annuals will stand 20° F. of frost under such conditions, and subjects such as Shirley Poppy, Larkspur, *Nigella*, *Eschscholtzia*, and, surprisingly, *Platystemon californicus* and *Limnanthes Douglasii* will come through unscathed at least five winters out of six. The resulting plants flower several weeks earlier than spring sown, remain in flower longer, and have much longer flower stems for cutting.

I should also like to suggest that annuals and biennials may make a most useful addition to the well-furnished rock garden. Very careful selection of subjects must of course be made. I have the support of that great gardener, the late MISS JEKYLL, also of The Royal Horticultural Society's *Dictionary of Gardening* in making this suggestion. I would recommend without hesitation, *Anagallis linifolia*, both the red and the beautiful blue forms; *Ionopsidium acaule*, *Antirrhinum* 'Little Gem,' *Eschscholtzia tenuifolia*, *Phacelia campanularia*, *Nemophila insignis* and many others.

Many plants with sweetly scented flowers can be found too among annuals and biennials and are invaluable in the garden especially in the evening. Night-scented Stock, so easily grown and inexpensive; *Oenothera trichocalyx*, flowering all the summer with a scent like Honeysuckle, is one of the most beautiful white flowers in the garden, and one of the few Evening Primroses whose flowers remain open in the daytime. Other subjects include Tobaccos, *Verbena*, Pansies, Wallflowers, and of course Mignonette, and many others too numerous to mention now. The choice is indeed a wide one.

Annuals and biennials can be most valuable in a garden where one has only a short tenancy. Quite a satisfactory garden can be made with hedges of annual climbers; borders of brilliant colours; corners of

sweet-scented flowers; window boxes and formal beds all furnished with annual and biennial plants at comparatively small expense. Again, if one has the misfortune to take over a piece of land very full of weeds, a good plan is to stick to annual flowering plants only, for at least the first year or two until one can get the cultivation and cleaning of the land well under way.

I hope I have now said enough to interest most of you in this group of garden plants, and to have proved their great value in nearly every kind of garden.

Perhaps you will allow me to use the time still available to describe to you one or two specific subjects, particularly those forms in which I have been especially interested.

Let me turn first to South Africa, that storehouse of good garden annuals, and especially of the Composites, the colourful and free-flowering Daisies of that country. Many species of *Arctotis* have been tried out in this country in recent years, and since they hybridize freely and effectively some very useful races of plants have been built up. These are mostly easily grown given a moderately good soil, an open situation and the help of a little gentle heat to start them in the spring. *Arctotis* 'Special Hybrids' have arisen from the intercrossing of at least five or six species, and the final result now is a race of plants with attractive grey foliage, above which rise flower heads with stalks 15–18 inches long. The large Daisy-like flower heads are 2–3 inches across and have a very wide range of colouring from white through pink, bronze, rich red, crimson, cream, yellow, orange and wine shades, many with beautiful markings at the base of the ray florets. If planted out in May, they come into flower towards the end of June and remain in flower until stopped by frost (Fig. 57). Another useful strain is that of *Arctotis* × 'grandis Hybrids'; these have longer flower stems but the flower heads have less vivid colouring consisting mainly of pastel shades of buff pink, cream and pearly white, many with attractive centres of powder blue. The latest introduction in this series is a hybrid strain known as *Venidio-Arctotis* × 'Triumph,' which received an Award of Merit at Chelsea Show last year. These have a similar habit to that of 'Special Hybrids' but with much longer flower stems and very attractive colouring of bronze, yellow, pink, wine and crimson shades. The plants flower profusely and continuously from April till November, each plant being 2 feet high and as much across. Propagation has proved difficult as the plants are nearly sterile and cuttings sometimes difficult to obtain, as every shoot ends in a flower bud. It is hoped in time to surmount these difficulties.

Another South African Composite which has been transformed by the plant breeder from a garden point of view in recent years is *Gazania*. Two varieties are now obtainable in distinct ranges of colour, namely 'Red and Orange Shades,' and 'Pink and Cream Shades.' Where one has enough sunshine these are well worth growing. I find it is well to plant Gazanias quite early, at least by the middle of May in, say, the

Thames Valley. In fact the secret with South African annuals generally is to keep the plants cool and moist when they are young and to keep them growing. They like moisture and must not be starved, but of course when they start to flower they require sunshine. The same conditions apply to *Dimorphotheca*. The range of colours of the 'aurantiaca hybrids' has been greatly increased; another striking new variety is one known as 'Glistening White.' The remark about moisture applies particularly to the forms of *Lobelia erinus*. An unusual effect can be had from a patch consisting of a mixture of all the colours available; these include white, several good blues of various shades, crimson and purple. This makes a very attractive patchwork of colour, remaining in bloom all summer. To relieve the flatness of such a bed, there are many suitable subjects for over-planting. One suggestion might be *Oenothera trichocalyx*, described earlier.

There are many other beautiful annuals from South Africa such as *Felicia adfinis*, and the free-flowering variety known as 'Azure Blue.' *Ursinia* in shades of brilliant orange, *Cotula barbata*, the pincushion plant, forming a boss of neat green foliage over which stand out lemon-coloured rayless heads on thin stalks. Many other subjects could be mentioned.

North America is another rich storehouse of good annuals, especially California and Mexico. Great strides have been made in recent years in selecting and hybridizing in the genus *Godetia*. The colours of the Tall Double section have been much improved, and the range increased. Such varieties as 'Rich Pink,' 'Cherry Red,' and 'Cherry and Crimson Shades' are invaluable for cutting and in borders. Some of the best of the dwarfer growing varieties are 'Sunset Crimson,' 'Azalea-flowered Bright Crimson' and 'Cerise Pink,' 'Orange Glory,' 'Dwarf Lavender,' and lastly the deepest colour yet attained 'Sutton's Blue.'

Two outstanding varieties have been added to the useful *Eschscholtzia* or Californian Poppy, namely 'Aurora,' cream pink, and 'Fireglow,' a glowing orange (Fig. 54). *Penstemon glaber* 'Hybrids' which received the Silver Lindley Medal from The Royal Horticultural Society in June 1932, form low-growing plants flowering easily from seed, and with spikes of flowers of the most lovely pastel shades of bright blue, pale blue, pale pink and rose pink, and white; these come into full flower in early June and are loved by bees.

A new hybrid Sunflower known as 'Autumn Beauty' is particularly good for cutting. This is a hybrid of *Helianthus annuus* 'red form' × *H. cucumerifolius*. The hybrids have the smaller-sized flowers of *cucumerifolius* with neat small centres and are borne on long, stiff, thin stems; they have a wide range of unusual colouring, primrose, yellow, bronze, brown and maroon.

To go still further, to China, I would like to mention some of the new Chrysanthemums, which can now be treated as annuals; in other words flowered in one year from seed. From the well-known 'Cascade' type arose a dwarf mutation which was given the name of 'Charm.' In eight

months from sowing the seed, these form compact bushes 18 inches to 2 feet high and 3 feet across, covered with small sweetly-scented single flowers in all shades of colour known in the Chrysanthemum. They flower from the end of October to the end of November, and for this reason are best given the protection of glass when commencing to flower, although the plants themselves are perfectly hardy. A new early-flowering strain has now been fixed with the same free-flowering bushy habit. This will commence to flower about mid-September and will remain in flower until the end of October in the open border. *Chrysanthemum* 'Korean Hybrids,' too, are well worth raising from seed, and if sown in gentle heat in the spring will flower freely in the open border in September and October.

I would like to finish by coming nearer home, viz. to Europe. There is a form of *Echium plantagineum* known as 'Dwarf Bedding Mixed,' which for ease of growing, freedom of flowering and standing up to all weathers is hard to beat. The plants grow 12–15 inches high and are covered in flowers of the most delightful shades of blue, pink, rose pink, purple and white, lasting for six to eight weeks. *Scabiosa atropurpurea*, the Sweet Scabious, another European plant, has also sported into most delightful shades of colour. Instead of the original dull mauve there are now several good shades of blue, pink, salmon pink, rosy mauve, rose pink, red and white. To get the most vigorous plants and best blooms with long stems for cutting, sow in cold frames in October, prick out into trays, keep in cold frames during winter and plant out at the end of March. You will then get plants 3–4 feet high and 12–15 inches across covered in flowers for four to five months of the summer.

Larkspur is another indispensable European annual. From the old violet-coloured *Delphinium Ajacis* has arisen under cultivation a wide variety of colouring and habit, and nothing is better for cutting, the spikes lasting well in water. Larkspurs are one of the best subjects too for sowing in the open ground in autumn. In our open land at Slough I have rarely known them to fail, and from these autumn-sown plants one gets spikes of flowers 4–5 feet high.

I am afraid my time limit is up and I must close, although I have by no means exhausted my subject. Here are the lists to which I alluded earlier.

ANNUALS FOR CUT FLOWERS

Acroclinium (Fig. 55)	Coreopsis	Larkspur
Arctotis (Fig. 57)	Cornflower	Lavatera
Aster	Cosmea	Linaria
Calendula	Dahlia	Mignonette
Carnations, Marguerite	Eschscholtzia (Fig. 54)	Nasturtium
	Godetia	Nemesia
Chrysanthemum, Annual (Fig. 56)	Gypsophila	Nigella
	Helichrysum	Poppies, Annual
Clarkia elegans	Jacobaea	Rhodanthe

ANNUALS FOR CUT FLOWERS—*continued*

Rudbeckia
Scabious
Statice
Stock
Sunflower
Sweet Pea
Sweet Sultan
Ursinia
Viscaria
Zinnia

ANNUALS FOR AUTUMN SOWING

Calendula
Candytuft
Cheiranthus Allionii
Clarkia
Cornflower
Eschscholtzia
Godetia
Larkspur
Limnanthes
Linaria
Nigella
Platystemon californicus
Poppy, Shirley (*Papaver Rhoeas*)
" Tulip (" *glaucum*)
" Opium (" *somniferum*)
Scabious (Sweet Scabious)
Silene

ANNUALS AND BIENNIALS FOR GROWING IN POTS FOR GREENHOUSE AND CONSERVATORY

Acroclinium (Fig. 55)
Agathaea coelestis
Alonsoa
Anchusa
Antirrhinum
Aquilegia
Arctotis
Begonia
Browallia speciosa major
Calceolaria
Calendula
Campanula pyramidalis
" persicifolia
" 'Sutton's Basket'
Canterbury Bell
Carnation, Marguerite
Celsia arcturus
Chrysanthemum, Annual
" Perennial
Cineraria
Clarkia elegans
Cornflower
Cyclamen persicum
Datura
Delphinium sinensis, 'Blue Butterfly' and other varieties
Dianthus Heddewigii
Didiscus coerulea
Dimorphotheca aurantiaca
Dimorphotheca chrysanthemifolia
Echium plantagineum
Eschscholtzia
Felicia
Freesia
Gaura Lindheimeri
Geum
Gilia coronopifolia
Godetia
Gypsophila
Heliophila
Impatiens
Kalanchoe Blossfeldiana
Kochia
Larkspur
Limnanthes Douglasii
Limonium (Statice) Suworowii
Linaria
Lobelia
Marigold, French and African
Meconopsis Baileyi
Mesembryanthemum criniflorum
Mignonette
Mimulus
Myosotis
Nasturtium
Nemesia
Nemophila insignis
Nicotiana affinis

ANNUALS AND BIENNIALS FOR GROWING IN POTS FOR GREENHOUSE AND CONSERVATORY—*continued*

Nicotiana Miniature White
Petunia
Phacelia viscida
Phlox Drummondii
Polyanthus
Poppies, Annual
Primrose
Primula malacoides
„ obconica
„ sinensis
Rehmannia
Rhodanthe
Rudbeckia, annual varieties
Salpiglossis
Scabious
Schizanthus
Stock (Winter-flowering, Intermediate and Giant Perfection)
Sunflower
Swan River Daisy
Tithonia speciosa
Torenia
Trachelium
Ursinia
Venidium fastuosum
Verbascum 'Silver Spire' and phoeniceum
Viola
Viscaria
Wallflower
Zinnia

ANNUALS FOR THE ROCK GARDEN

Acroclinium
Adonis aestivalis
Agrostemma coeli-rosea
Alyssum
Anagallis
Antirrhinum, Sutton's Little Gem
Asperula
Cacalia coccinea
Calandrinia umbellata
Collinsia bicolor
Cotula barbata
Cuphea minata
Delphinium sinensis
Dimorphotheca (particularly 'Glistening White' and 'Buff Beauty')
Erysimum
Eschscholtzia, Miniature Primrose
Felicia
Gazania
Godetia, Dwarf Mauve
Ionopsidium acaule
Kaulfussia
Leptosiphon hybridus
Limnanthes
Linaria
Linum grandiflorum rubrum
Mesembryanthemum criniflorum
Nemesia
Nemophila insignis
Nierembergia
Phacelia campanularia
Platystemon californicus
Portulaca
Swan River Daisy
Ursinia
Venus' Looking Glass
Verbena
Viola, Miniature varieties
Virginian Stock

ANNUAL CLIMBING PLANTS

Canary Creeper
Cobaea scandens
Convolvulus major
Eccremocarpus scaber
Humulus japonicum—Annual Hop
Ipomoea rubro-coerulea
Maurandia scandens
Mina lobata
Nasturtium, Tall
Ornamental Gourd (Cucurbita)
Sweet Pea

ANNUALS FOR WINDOW BOXES

Ageratum
Alyssum
Antirrhinum
Aster, Dwarf varieties
Begonia
Calendula officinalis
Celosia
Clarkia pulchella
Collinsia bicolor
Convolvulus major
„ minor
Coreopsis, Dwarf varieties
Dimorphotheca
Eschscholtzia
Gypsophila elegans
Linaria
Lobelia
Marigold, French
Matthiola bicornis
Mignonette
Nasturtium
Nemesia
Nemophila insignis
Nierembergia
Petunia
Phlox Drummondii
Salvia
Silene
Stocks, Bedding varieties
Swan River Daisy
Verbena

ANNUALS AND BIENNIALS FOR FORMAL BEDDING

Ageratum
Anchusa, Annual Bedding varieties
Antirrhinum (Fig. 51)
Arctotis
Aster
Begonias
Browallia
Canterbury Bells
Carnations, Annual
Celosia
Dahlia
Double Daisies
Dianthus Heddewigii
Dimorphotheca
Echium, Bedding varieties
Godetia, Dwarf varieties
Kochia
Larkspur, Dwarf Rocket
Lobelia
Marigold, African
Marigold, French
Myosotis
Nemesia
Nicotiana
Pansy
Perilla
Petunia
Phlox Drummondii
Polyanthus
Primrose
Rudbeckia
Salpiglossis
Salvia
Stock
Sweet William (Annual and Biennial)
Verbena
Viola
Wallflower
Zinnia

ANNUALS FOR COVERING ROUGH BANKS

Calendula
Chrysanthemum, Annual
Convolvulus major
„ minor
Coreopsis
Cornflower
Eschscholtzia
Lavatera
Linaria
Lupins, Annual
Nasturtium, Tall
„ Dwarf
Poppy, Opium
„ Shirley

ANNUALS AND BIENNIALS FOR PARTIAL SHADE

Anchusa
Anemone
Aquilegia
Begonia
Bellis
Campanula
Canterbury Bell
Catananche
Cineraria maritima
Coreopsis
Cynoglossum
Digitalis
Geum
Linum
Lupinus
Meconopsis Baileyi
Mimulus
Myosotis
Nemophila
Nicotiana
Oenothera
Pansy
Phlox Drummondii
Polyanthus (Fig. 50)
Primulas, Hardy
Saponaria ocymoides
Sidalcea
Sweet Rocket
Thalictrum
Trollius
Verbascum phoeniceum
Viola

HARDY BIENNIALS AND PERENNIALS TO BE RAISED FROM SEED FOR THE FLOWER BORDER

Achillea
Aethionema
Agrostemma
Alstroemeria
Alyssum saxatile
Anchusa
Anemone
Aquilegia
Arenaria montana
Armeria
Aster alpinus
„ amellus
„ subcoeruleus
Auricula
Campanula
Candytuft, Perennial
Canterbury Bells
Carnations
Catananche coerulea
Centaurea montana
Cerastium
Cheiranthus Allionii
Chelone
Coreopsis grandiflora
Cowslip
Cynoglossum
Daisies, Double
Delphinium
Digitalis
Echinops
Erigeron
Gaillardia
Gentiana
Geum
Gynerium
Gypsophila paniculata
Helenium Hoopesii
Heuchera
Hollyhocks
Honesty (Lunaria)
Hypericum
Incarvillea
Lathyrus latifolius
Lilies
Linum collinum
„ flavum
„ narbonense
„ sibiricum
Lupinus polyphyllus
Lychnis
Malva moschata
Meconopsis
Michaelmas Daisy
Myosotis
Oenothera
Pansies and Violas
Papaver nudicaule
„ orientale
Penstemons
Physalis (Winter Cherry)
Pinks, Hardy
Polemonium

HARDY BIENNIALS AND PERENNIALS TO BE RAISED FROM SEED FOR THE FLOWER BORDER—*continued*

Polyanthus
Primrose
Primulas, Hardy
Pyrethrums
Rudbeckia
Rock Cistus
Salvia haematodes
Saponaria ocymoides
Scabiosa caucasica
Silene Schafta
Stachys lanata
Stock, Brompton and East Lothian varieties
Sweet Rocket
Sweet William
Thalictrum
Thistle, Giant
Tritoma
Valerian
Verbascum
Veronica
Wallflower

PLANTS AND PROBLEMS V

A PALM IN A POT

Question. For about three years I have grown a Palm in a pot in the front room of our house. Now the leaves are going brown and the plant has an unhealthy appearance. Can you please let me know cultural details for this plant as I am determined to have another one if you think Palms are really suitable for growing indoors ?

Answer. Palms make excellent house plants and are not difficult to grow provided their few requirements are attended to carefully.

Probably failure in your case is due to a low temperature, a dry atmosphere or a combination of both factors. During the summer, growth should be encouraged by watering freely and by keeping the foliage free of dust by regular sponging, while large plants may be stood out-of-doors and vigorously sprayed with water from a hose. In winter sufficient water should be given to keep the soil moist.

Palms do best when the roots are restricted and it is only when these form a thick mat around the crocks that repotting is necessary. When transferring the plant, care must be taken to shake out the roots most carefully as even slight damage may prove fatal. The compost to use for potting is one of equal parts of fibrous loam, leaf mould or granulated peat and grit. This mixture should be worked around the roots and then rammed firm. As the roots get established a feed will be beneficial during the growing season, and one can be given in the form of alternate waterings with dilute liquid animal manure and with soot water.

REDUCING A HEDGE

Question. We have recently moved to a house surrounded by a Holly hedge 11 feet high and 4 feet thick. To save time and labour in the long run, could the gardener safely reduce this monster to reasonable proportions ?

Answer. If the Holly hedge is in good health, green from top to bottom, and growing vigorously, it can safely be cut back and we suggest it be reduced in April or May to 6 feet. Next year, a foot of growth can be taken off one side and the following year the other side may be treated in a similar manner.

We appreciate that sometimes the top and sides of a Holly hedge are taken off in one operation with no apparent ill-effect but we do not consider this a wise practice.

ONION SETS

Question. I notice that Onion sets are advertised in the horticultural papers. As I have not tried these I would be grateful if you could tell me if they are a sound proposition and also how to grow them.

Answer. It is usually advantageous to grow Onion sets for the following reasons :—

(*a*) An increased yield is obtained.

(*b*) They are easier to harvest as their growth finishes earlier. This is particularly important in northern areas where difficulty is often experienced in harvesting onions.

(*c*) The crop usually avoids attacks by onion fly.

The disadvantage is that they are liable to bolt especially in a wet season.

Sets may be procured from seedsmen or it is possible, especially in the south of England, to grow them yourself.

If you decide to grow the sets seed should be sown in May at the rate of 1 oz. per square yard, it being usual to sow in rows 1 inch apart. The aim is to produce small hard bulbs not more than $\frac{5}{8}$ inch diameter. About 7 lb. of sets will be produced per square yard. Store the sets in a cool dry place during the winter discarding any which sprout early.

Planting is done in early March in the South and 3–4 weeks later in the North. The rows should be 15 inches apart with sets 9 inches apart in the rows, buried just under the surface of the soil. The site chosen for Onion sets should be one that has been well manured for a previous crop.

Suitable varieties include 'Ebenezer,' 'Wethersfield Red,' 'Giant Zittau.'

FREESIAS FROM SEED

Question. I have heard that Freesias can now be grown from seed. Please could you give me details of their cultivation.

Answer. There are now available fine strains of Freesia seed from which it is possible to obtain plants in flower within 7–8 months of seed sowing. Seed may be sown in April for November–January flowering, or in August for March–April flowering. Seed should be sown direct into the boxes or pots in which it is proposed to flower the plants as Freesias resent disturbance at the root. Boxes

or pans that are 6–7 inches deep should be chosen and should be filled with John Innes Potting Compost No. 2. After sowing the boxes or pots should be placed in a house at a temperature of 65° F. which after germination is reduced to 55° F. The spring-sown plants may be removed to a cold frame for the summer but care must be taken to prevent the plants rooting into the bottom of the frame. The foliage should be supported with pea-sticks or where large quantities are grown with wire-netting. The plants should be housed in September at a temperature of 55° F. Watering should be done only sparingly at this stage. Each plant will produce about three flower stems. After the main one has been cut a liquid feed with nitrate of chalk should be given to help on the growth of the laterals.

BARK RINGING OF APPLES AND PEARS

Question. Could you please advise me how best I can encourage some well-established Apple and Pear trees to fruit? Each year they make masses of growth and any pruning I do only seems to make things worse.

Answer. Where Apples or Pears are growing too vigorously at the expense of fruiting, bark ringing is recommended. This involves the removal of a narrow ring of bark encircling the trunk. Complete ringing is now preferred to the once favoured practice of removing two half-circles. The width of the band of bark cut away should increase with the diameter of the trunk but in no case should it be more than a quarter of an inch. The bark must be cut away down to the hard wood. Care should be taken not to injure the wood, however, and the wound must be covered immediately with adhesive tape to guard against any infection.

This operation is best done in late April or early May and encourages the formation of fruit bud for the following year. Its effect will usually last for three or four years after which the process may have to be repeated depending on the vigour of the trees.

Bark ringing is not recommended for stone fruits, and the growth of excessively vigorous Plums and Cherries can be checked, and fruit formation thus encouraged, by root pruning.

"RUNNING OFF" IN BLACK CURRANTS

Question. Some Black Currant bushes of mine set an apparently good crop but on re-examining them I find that most of the young berries have dropped off. Can you please tell me the reason for this as the bushes are very healthy and vigorous?

Answer. This trouble is commonly called "running off" and is due mainly to imperfect pollination. Cold windy weather during the flowering period can seriously restrict the activity of bees and other pollinating insects. As a result the flowers are not pollinated and remain infertile and although small berries may develop they soon drop off. At the same time, the flowers can be damaged and rendered

FIG. 50—Polyanthus, a mixed batch of seedlings growing under flowering Crabs and Cherries in Langley, Bucks.

Photos, Sutton & Sons Ltd.

FIG. 51—Antirrhinums in the gardens of Warren House, Buckinghamshire (MRS. ALFRED CLARK).

FIG. 52—Schizanthus in a conservatory with *Senecio multibracteatus* in right foreground (See p. 207)

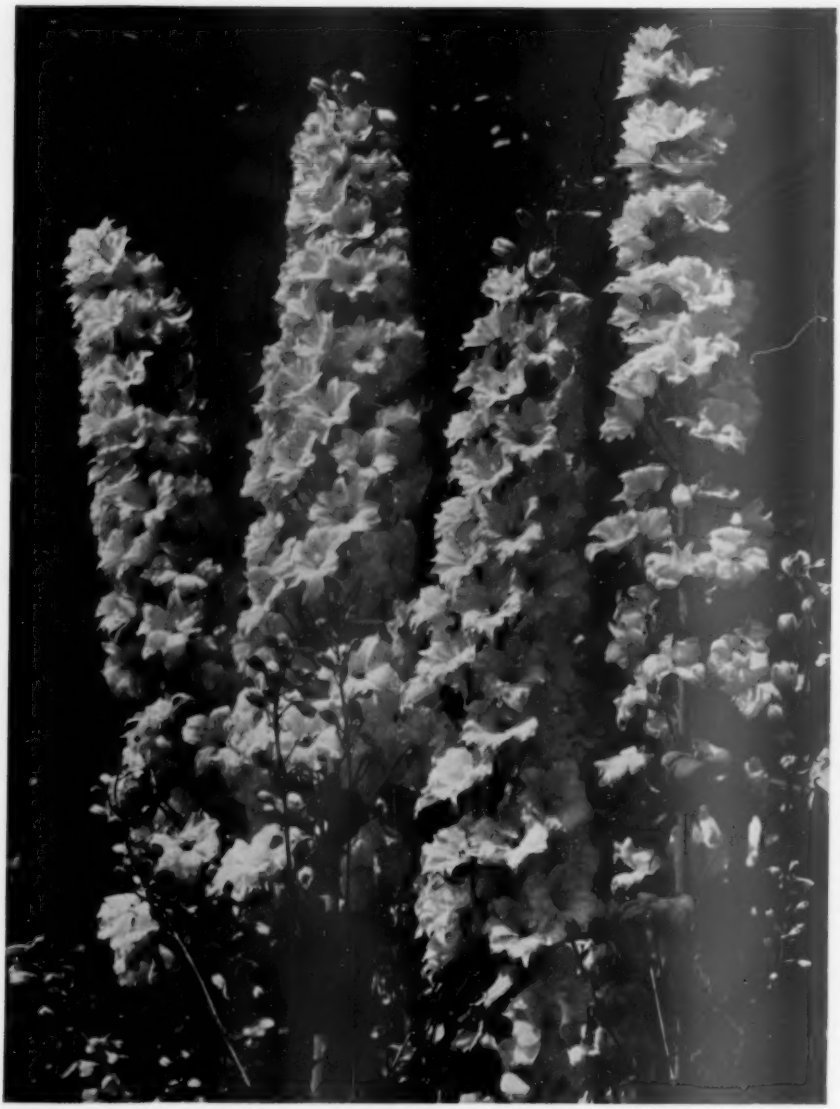


FIG. 53—*Delphinium* 'Sutton's White'

FIG. 54—*Esehscholtzia* 'Aurora' and 'Fireglow' (See p. 210)

Photos, J. E. Downward

FIG. 55—Everlasting *Acroclinium roseum*

FIG. 56—Annual Chrysanthemums

FIG. 57—Arctotis 'Special Hybrids' (See p. 209)

Photo, Sutton & Sons Ltd.

infertile by late spring frosts which at a later stage can also injure the young berries and so cause "running off."

Some varieties, *e.g.* 'Seabrook's Black' and 'Boskoop Giant,' are more prone to this trouble than others, and if one is situated in a notably dull or exposed area it would probably be advisable to avoid these varieties. As a general rule it is wise to grow Currants in a fairly sheltered position. Where bees can be kept these are undoubtedly a good insurance against " running off."

ROSE BLACK SPOT

Question. My Roses suffer from Black Spot disease and I would be glad to know the latest advice on spray treatment.

Answer. The spray at present recommended for Black Spot disease of Roses is Colloidal Copper White Oil to be applied soon after pruning at a strength according to the maker's instructions. This can be repeated as necessary. If the bushes are weak it is not advisable to use copper-containing sprays as there is a risk of injury to the leaves. In such cases the soil conditions may need to be studied and if necessary attempts made to improve them. It may be wise to lift the bushes and by deep digging and the inclusion of humus to improve the drainage and enrich the bed so that healthy root action can proceed and the plants gain in vigour. Vigorous plants will to some extent resist the attack of Black Spot and they can always be further protected by timely spraying.

'BREAKING' IN TULIPS

Question. Last season some of my Tulips which should have been red showed white streaks in the petals. I am told this is a disease and would like your opinion.

Answer. The white streaks and splashes in the petals of some Tulips which are normally self-coloured (*e.g.* Darwin Tulips) are due to infection by a virus and the condition is known as "breaking." All varieties of Tulip can be affected yet the virus does not seem to affect them seriously although plants showing "breaking" are generally slightly weaker than normal ones and the leaves often show a mottled effect or a lighter green colour. The effect on the flowers is often not unpleasing and certain commercial types are composed of plants with "broken" flowers (for example the "broken" Darwin Tulips known as Rembrandts). If, however, a stock of self-coloured Tulips such as Darwins is required to be kept true to colour any plant which shows signs of "breaking" should be destroyed. The virus is spread by aphides and if infected bulbs are allowed to remain in the bed "breaking" will increase in a stock, the degree of increase depending to some extent on whether or not the seasonal weather encourages aphides.

WIREWORMS IN A NEW GARDEN

Question. I would much appreciate your advice on the problem of eradicating wireworms from a new garden.

Answer. Wireworms, which are the larvae of the beetle *Agriotes* sp., are often a serious problem in a new garden and since they spend several years in the larval stage the problem is liable to persist for two or three years following intensive cultivation. However, the adult beetles show a strong preference for grassland in which to oviposit and, therefore, cultivation is in itself a control measure.

BHC (benzene hexachloride) has given spectacular results against wireworm and is normally used as a 5 per cent. dust at the rate of 1 oz. to the square yard. Since BHC has a low degree of phytotoxicity it is safe to use it amongst growing plants and after application it should be hoed or raked into the top few inches of soil.

Unfortunately BHC taints certain vegetable and soft fruit crops and since this tainting effect can persist in the soil for up to three years it should not be used directly on such crops or on land intended for these crops during the following two years.

Crops most susceptible to taint include Potatoes and other root crops and soft fruits, particularly Black Currants.

A more purified form of BHC is now available under the name of gamma BHC or Lindane, and possesses less of the tainting property. It can be applied to soil intended for vegetables but should not be used directly on Potatoes, Onions or Black Currants.

Finally, we should like to point out that BHC formulations control a wide range of pests and are particularly useful for the ornamental and top fruit garden.

VINE WEEVIL DAMAGE ON RHODODENDRON

Question. I have had considerable trouble with what I am told are Vine Weevils attacking the leaves of my Rhododendrons. I should be glad to know if you could suggest a remedy for dealing with this problem.

Answer. The adults of the Vine Weevil, *Otiorrhynchus sulcatus*, feed on the leaf margins of a wide range of plants, causing a scalloping effect. This damage is most noticeable on Rhododendrons. Young plants often suffer seriously whereas on older established plants it is usually only the lower leaves which are affected.

The dark brown adults appear in spring and in summer and since they are nocturnal in habit are rarely seen. In the soil they lay their eggs which give rise to legless, creamy-white wrinkled grubs. These feed on the underground portions of plants. The grubs continue feeding throughout the summer and winter but damage is only serious when they occur in the soil of potted plants, *e.g.* Primulas, Begonias and Cyclamen under glass. When fully fed in early spring, the grubs pupate in the soil and adults emerge a few weeks later.

Rhododendrons should be sprayed with DDT (dichloro-diphenyl-trichloroethane) emulsion, used according to maker's instructions, during spring and early summer. In most cases a single application is sufficient.

THE MEANING OF SOIL ACIDITY

Walter Heydecker

THE concept of "sour (or acid) soil" may have meant something fairly straightforward, e.g., soil in need of lime, to our forbears. Too often, however, the response of soils to applications of lime was unpredictable and baffled the shrewdest observers. Scientific investigators felt challenged to solve the paradoxical problems which arose.

Great progress has been made in the analysis of the different factors causing acidity symptoms in crop plants especially at Long Ashton Research Station (1, 2), whilst the latest edition of SIR E. J. RUSSELL'S classical work on *Soil Conditions and Plant Growth* (3) gives a detailed account of the present state of scientific knowledge on the subject. A practical handbook on *The Use of Lime in British Agriculture* (4) has also recently been published. In the following notes an attempt will be made to present a simple account of the intricacies which have a bearing on horticultural practice.

THE *p*H SCALE

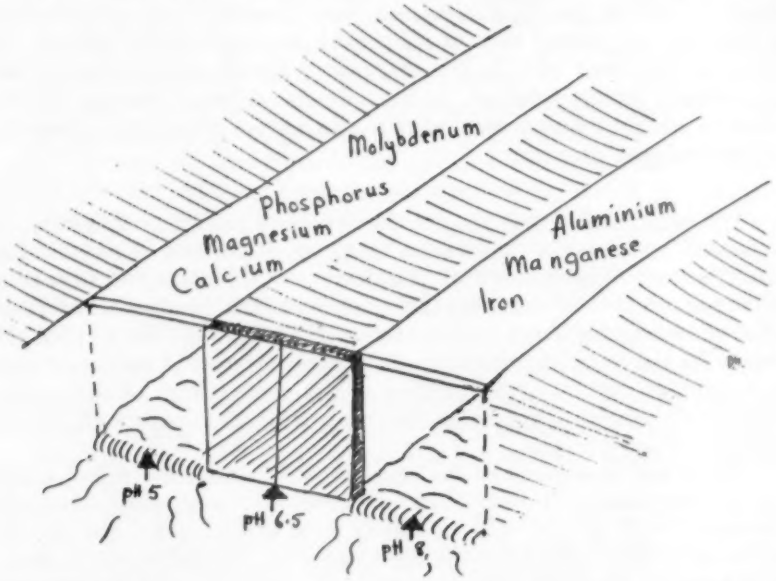
The soil reaction, referring to the degree of acidity or alkalinity, is expressed by a scale of "*p*H values" ranging, in the case of soils in this country, from about 4·0 to 8·4. The lower the *p*H figure, the more acid is the soil. A *p*H of 7 indicates that a soil is neutral, i.e., neither acid nor alkaline and figures above 7 show that a soil is alkaline. The symbol *p*H stands for the negative logarithm of the concentration of hydrogen ions in a solution, but an understanding of the mathematics of this rather frightening concept is not needed for the intelligent use of the *p*H figure in horticultural practice.

There are limitations to the accuracy with which the *p*H of a soil can be determined. It differs from one cubic inch to another, especially between a root surface and the soil an inch or less away, and for the same soil it may differ from one day to another, depending on its moisture content. However, the average *p*H of a soil can easily be measured and is an important characteristic to the horticulturist who can interpret and use its message.

The significance of the *p*H figure may be compared with the rate of flow of a river. The fact that the water moves at the rate of so many feet per second does not indicate how wide, how deep, how clean or how full of fish the river is. But in a shallow or narrow river a small change in the amount of water makes much more difference to the rate of flow than in a deep or wide one. Light soils—which commonly have a natural tendency towards being poor soils—can be likened to shallow rivers. Heavy soils and organic soils—which are potentially rich soils—resemble deep rivers. Whilst the *p*H figure indicates the acid status of a soil it does not, for instance, show how much lime would be required to alter the *p*H. Gain or loss of the same amount of lime makes less difference to the *p*H of a heavy soil than to that of a light one.

The more a soil resists a change in its *p*H the better "buffered" it is said to be.

To understand the effects of acidity and alkalinity on plant growth we may substitute for our previous picture one of an unconventional sluice gate which moves sideways (see illustration below). Nutrient elements fall into two natural groups which can be regarded as arriving at the gate in two separate streams. In a slightly acid soil (*p*H about 6·3) the gate is so placed that desirable amounts of both streams can pass from the soil into the plants. A high *p*H, though allowing a lot of calcium, magnesium and phosphorus to pass, locks up manganese and iron. A low *p*H locks up calcium, magnesium, phosphorus and molybdenum,



while allowing undue amounts of manganese and aluminium to pass into the plants. All these elements (except probably aluminium) are essential to plants in varying, though sometimes very small, amounts. A deficiency of any one of them may render plants sick and may ultimately kill them. But excesses of aluminium and manganese may poison the soil for many horticulturally important plants (see Table 1).

THE ROLES OF LIME

Neutralization

If the *p*H is too low, compounds of the elements calcium can be used to move the sluice gate to the right and neutralize soil acidity. But only two of the range of natural calcium compounds, limestone and chalk (both chemically calcium carbonate) can effect this neutralization and the term "lime" should be reserved for these two and their

man-made derivatives quicklime and slaked lime. Quicklime, which is chemically calcium oxide, is also sold as shell lime, ground lime, burnt lime or "hot" lime. Slaked lime, on the other hand is calcium hydroxide, and may be sold as hydrated lime or hydrate of lime. Both quicklime and slaked lime are processed from the original calcium carbonate to which they revert fairly rapidly once applied to the soil. The various products available are dealt with in detail in the Ministry of Agriculture's bulletin on liming (5).

Compared with other minerals containing calcium, all the liming materials referred to render the soil less acid by supplying a strong "base," namely calcium, without at the same time adding a strong acid radicle as would be the case if gypsum (calcium sulphate) were used.

Nutrition

Calcium compounds have additional properties that enhance their value as soil neutralizers. Calcium is in itself an important plant food, and some effects associated with acidity are indeed caused by lack of calcium rather than excessively low *p*H. For instance, Potatoes and Tomatoes soon suffer from calcium deficiency, although not requiring a high *p*H. In such cases gypsum, which does not raise the *p*H, should theoretically be no less useful than lime, though calcium applied in the carbonate form does appear to be more palatable to plants than as sulphate (4, p. 77).

Base Exchange

In fact, gypsum has been freely applied to soils flooded by sea water to let them benefit from a further property of calcium without making the soils more alkaline, namely, its ability to form a crumb structure. Sodium from the salt (sodium chloride) in sea water is retained by the clay particles in the soil, even after all the water that can do so has drained away, producing the "sodium clay" of notorious stickiness. Excessive doses of nitrate of soda have the same effect on heavy soils. By a complicated mechanism called "base exchange" calcium entering such a soil "casts out" the sodium and, by causing the clay to release much of its water it helps to drain and to aerate the soil, warm it up and make it a suitable medium in which roots can breathe and grow once more.

Effect of clay soils

The well established idea that *every* clay soil can be "lightened" by applications of lime does, however, still lack scientific proof (3, p. 408). In fact, the sticky sodium clays are strongly alkaline. Very acid clays, on the other hand, are not necessarily any stickier than near-neutral ones. There is no proof that the relatively light dressings of lime required to neutralize acidity in the clay soils of this country will make such soils more workable. The remedial dressings referred to by our forefathers, which seem to have been in the region of 20–40 tons of

chalk per acre, were probably effective because of their mechanical action rather than their effect on soil *p*H. Similarly, the fertile soils on the Lias clay of the Vale of Evesham are commonly believed to owe two of their enviable properties—ease of cultivation and excellent drainage—to their calcareous character: but clays of the Gault type too are calcareous and yet are notorious for their intractability; moreover, they do not seem to respond even to heavy applications of lime.

Soil life activation

The virtue of lime as a soil improver is due to one more highly important factor: its influence on the life within the soil. If the soil reaction is sufficiently acid, a mat of dead vegetation accumulates on the soil surface and will only decompose with the greatest difficulty, if at all, even when dug into the soil. The most striking result of an attempt to grow crops under such conditions is a chronic deficiency of nitrogen which is kept locked up in the dead plants instead of being returned to circulation in the soil by microbial action, and without nitrogen no plant can grow satisfactorily. On the combination of reduced acidity and adequate soil aeration provided by lime compounds depend the activities both of the earthworms which bury dead organic matter and of the soil microbes which are responsible for "digesting" it and turn it into simple compounds once more available as nutrients for green plants.

How much lime?

A simple test for lime in a soil is to shake up a sample with hydrochloric acid or even vinegar. Fizzing indicates the presence of free lime, but although this test is simple, it has two disadvantages. Except when used in so expert a manner as described by GARDNER and GARNER (4), it only shows if free lime is present, but not how much; and if no free lime is present, one still is not told whether liming is necessary since a soil with a *p*H of 6·5, suitable for growing most horticultural plants, may produce no effect on the test acid and may thus be indistinguishable from a dangerously sour soil. On the other hand, for our purposes the easily obtainable soil indicator fluids, improvements on the colorimetric litmus test (red for acid, green for neutral, blue for alkaline) and accurate in their present form to 0·5 of *p*H unit, are as near to the truth as we need them. Still, the first time a soil is to be limed a lime requirement test by a specially equipped laboratory may be advisable for accuracy's sake. This provides more information than does a mere *p*H test, as it takes into account the fact that a heavy soil when acid contains many more "calcium hungry" clay particles than a light soil of the same *p*H. Contrariwise, light soils, though needing less lime at any one time, will need it much more frequently, as they cannot store up a reserve (Table 2). Moreover, the *p*H of sandy soils can easily be raised to dangerously high levels by careless applications of lime, whereas it is much more difficult to over-lime a clay soil (3, p. 598), owing to the fact that sufficient carbon dioxide or carbonic acid produced through the

respiration of soil microbes and plant roots is trapped in it to maintain little pockets of available iron and manganese.* On the other hand, the clay fraction of soils, once desaturated, tends to lose progressively its base-storing quality and thus becomes less "buffered" and inherently more acid (6).

Recent work (7) shows that even 50 per cent. of the lime needed to fulfil the calculated Lime Requirement will produce as much as 85 per cent. of the total possible benefit; hence the best procedure, at least for light and loamy soils, may be annual ground limestone dressings of up to 40 cwt. per acre (or nearly 1 lb. per sq. yd.), and no more, in order to forestall local overliming, until the amount calculated to bring up the *p*H to 6·3 has been applied. From then on a "maintenance dose" of 30–40 cwt. ground limestone will be needed every four years to compensate for loss of lime through (*a*) leaching out of the soil by rain water, (*b*) removal from the soil by crops—but this latter figure is usually less than one-third of the total loss. Heavier dressings are needed where the soil is cultivated to a depth greater than 8 inches, but in this case application of part of the lime before turning the soil is advisable for more even and rapid incorporation. Even a dressing to the second spit is a good thing if the subsoil is very acid. No advantage is claimed for any one type of lime for neutralizing purposes, but quicklime is inconvenient to handle and must not touch any green plant, whereas it is questionable whether hydrated lime, despite its very fine particle size and ease of distribution, is worth the extra cost. In fact, it has been found that as long as the particles are of a diameter no larger than $\frac{1}{8}$ inch it is an advantage to have no more than 40 per cent. of fine particles (i.e., passing a 100-mesh per linear inch sieve), thus providing a reserve which becomes gradually available. Many samples of ground limestone fit this specification.

INFLUENCE OF MANURES

Bulky organics, such as farmyard manure, green manure and cover crops, have these important effects: (*a*) they stimulate microbial activity; this in turn means increased " soil respiration " which means, we remember, production of carbon dioxide. Being weakly acid this enables the soil water to dissolve some bases which are insoluble in pure water: it dissolves calcium carbonate and, forming calcium bicarbonate, abducts the calcium down the drain. In consequence, the soil acidity increases through addition of organic matter. But (*b*) the humified portions of organic residues in soils act, as stated early on, as "buffers" in the soil, rendering the plants tolerant to a *very* much wider *p*H range. In addition (*c*) "imported" manures such as farmyard manure and sewage sludge may add themselves considerable amounts of lime, often easily outweighing their acidifying tendency.

Concentrated organic fertilizers (e.g., hoof and horn) devoid of compensating lime compounds, share their acidity inducing but not

* This, incidentally, is why even the heavy chalking of clay soil referred to earlier used to do no harm.

the important buffering effects of bulky manures; however, their weight per acre is small, and so is their total influence on the soil reaction.

Mineral fertilizers may increase or decrease soil acidity. Sulphate of ammonia, in consequence of its complicated process of nitrification in the soil (6) is the example *par excellence* of a physiologically acid fertilizer. It causes more or less the equivalent of its own weight of ground limestone to be washed out of the soil, and this should be taken into account whenever it is used; this tendency should also be borne in mind when a nitrogenous fertilizer for crops with a high *p*H requirement is to be chosen. Though more desirable in this respect, nitrochalk does no more than neutralize its own acidifying action. Nitrate of soda has a mildly alkaline effect, but neither it nor the more alkaline calcium cyanamide has a marked effect on the *p*H as they are never applied in quantities large enough for this purpose. Superphosphate "of lime" contains gypsum but no lime; on the other hand it does not make the soil acid as sometimes suggested in the past. Of all commonly obtainable fertilizers basic slag alone contains appreciable amounts—up to half its weight—of calcium carbonate.

Despite the fact that most fertilizers have a negligible effect on the soil reaction as such, where a low *p*H goes hand in hand, as often it does, with a general nutrient debility, judicial feeding with a balanced fertilizer may be every bit as called for as liming; in fact, a sour soil may always be suspected of being a poor soil in need of plant food.

As alkaline soils, especially light ones, can sometimes be an even greater problem than acid ones, acidification by the "addition" of carbon dioxide should be remembered as a practicable way of increasing their fertility. Adding fresh manure, grassing down (a useful method of combating "lime induced" chlorosis in fruit plantations), applying sulphate of ammonia and rolling the ground to "bottle up" the carbon dioxide are all helpful here. Indeed, as long as there is enough of both lime and carbon dioxide, neither will do the harm they are both capable of doing separately and in excessive quantities.

What we want, then, to produce the best crops, are soils not so much of a very limited *p*H range, but containing a sufficient store of nutrients (including calcium), sufficient reserves of neutralizing bases (chiefly lime) and a sufficient fund of agents and raw materials inducing those physical, chemical and biological activities which promote acidity; then the continuous process of continuously moderated acidification will steadily mobilize the potential plant nutrients waiting to be unlocked in the soil. Naturally, the better the plants grow as a consequence, the more they deplete the soil of both lime and nutrients, and it should be obvious that, to prevent the process from "running down," both lime and nutrients must be added afresh in sufficient quantities.

ENVIRONMENT FACTORS

Both climate and parent rock do, of course, have a considerable influence on the natural tendency of the soil *p*H, although even soils

derived from and overlying calcareous formations can become acid. A moist climate like ours induces washing out of lime in the drainage water, and wetter regions, even in this country, tend to be more acid and, incidentally, phosphate deficient, than drier ones. Paradoxically the detrimental effect of an acid, or indeed of any, *p*H is much smaller in a wet than in a dry season. Also, while a soil is wet or boggy its *p*H is almost always by nature neutral or even alkaline (3), for the larger the bulk of water, the lower the concentration of a definite amount of hydrogen ions in it; only when such a soil is drained, it becomes automatically more acid—occasionally very acid indeed.

There are, however, the rare cases when bogs are colonized by plants capable of continuing to breathe with most of their bodies submerged; thus the carbon dioxide breathed out will acidify the stagnant water in which it dissolves. This happens where some species of Sphagnum moss and a few kinds of sedges grow. But not by all means all species of sedge or of Sphagnum, let alone moss, produce, stand or indicate acidity. Yet there appears prevalent a widespread and mistaken generalization equating waterlogging with acidity. The "argument" seems to be: Moss and sedge peats accumulate in bogs; peat is usually acid; *ergo*, all bogs and "boggy" soils are acid. Either or both of the following misleading facts may also contribute to that misconception: (*a*) the hard pan found in podsolic (naturally acid) soils may impede drainage (here cause and effect are mixed up). (*b*) Many crop plants grow equally badly under acid and waterlogged conditions—in both cases the biological processes of nutrient (chiefly nitrogen) release and plant root activity are suspended; yet the two causes are quite distinct: although the effects are so similar, an acid reaction is not the same as lack of air.

In addition to the acid or alkaline nature of the parent material from which a soil is derived, the water running into this soil may decisively influence it: though peats are commonly acid, the peat soils of the Fens, receiving water from limestone formations, are neutral or alkaline.

INDICATOR PLANTS

Naturally acid soils can, of course, be recognized with considerable accuracy by their native vegetation, as long as plant communities rather than individual species, let alone specimens, are looked for. Bilberries (found on the most acid soils), Rhododendrons and Wild Heather—often met with in the company of Scots Pine, Birch, Bracken and Gorse—are reliable calcifuges, or lime haters. None of the others are entirely reliable by themselves, although Gorse, a leguminous plant, at least contradicts the sweeping generalizations about the calcicole, or lime loving, nature of "all" Leguminosae. A perfect example of such a "sour community" may be found on the Bagshot sands in Surrey, surrounding the all the more incredible Shangri La of the Wisley gardens.

Some forest trees, e.g., Sitka Spruce, depend on strongly acid soil for their germination, but seeds of most crop plants do not, or only

sparsely and slowly, germinate on such soil, and where they do, many of the resulting seedlings soon die.

The weed population on very sour soils often occurs in patches and largely consists of Sheep Sorrel (*Rumex acetosella*) and Spurrey (*Spergula arvensis*) on lighter and the less well-known Knawel (*Scleranthus* spp.) on heavier ground. Many more, often quoted, are not so reliable (4). Most of the so-called "indicator weeds" can exist quite well in near-neutral soils, but do not suffer much from competition in acid ones. Amongst grasses, although many of them enjoy acidity, Wavy Hair Grass (*Deschampsia flexuosa*) is the one sure proof of its presence.

A fascinating account of the flora of calcareous soils, its underlying environmental factors and its dynamics has recently been published by SIR EDWARD SALISBURY (8) and will richly reward all those thirsting for knowledge and wisdom. For our purpose, there is obviously little need for a list of "indicator" plants on chalk soils, with the chalk apparent only a few inches below ground. But one might mention that some species of plants may be colonizing these soils because of their characteristic dryness rather than their high lime content, and such plants are capable of flourishing equally on non-calcareous dry soils. The creeping Wild Thyme is a case in point. Conversely, what differences there are between chalk and limestone floras are largely due to the limestone soils providing sufficient moisture for some lime-loving species which shun the dry chalk.

In no case, however, will there be any point in suspecting excessive soil acidity as the cause for crop failures where groups of any of the following flourish in the immediate vicinity: young Beech, Oak or Ash; Wayfaring Tree, Spindle Tree or Traveller's Joy; Kidney, Milk or Horseshoe Vetches and Sainfoin, Scabious, Candytuft, or Rock Cress (Wild Arabis); Milkwort, Yellow Toadflax and, probably, Wild Carrot and Wild Parsnip.

CLUB ROOT

A common idea is that liming "eradicates" club root from infected soil. The problem has received much attention recently (9, 10) and it appears that cruciferous plants can be severely attacked by the club root organisms on both acid and alkaline soils; but under alkaline conditions both a higher temperature and a vastly greater concentration of the causative organisms in the soil is needed to cause the dreaded disease. In every case the infection is worse when soil moisture is high. So liming is a welcome palliative, but good drainage and long enough rotations are also essential. Trap crops have recently been suggested as a means of reducing the danger of infection; these lure the disease out of its resting stage and are then ploughed in at the right time to prevent it from completing its life cycle.

THE RIGHT *p*H IN GARDENS

When all is said and done, differences between species of the same genus and even varieties of the same species in their preference or

tolerance of acidity levels, and choice between soils even of the same *p*H, bewitch all efforts to pin down each plant to a particular "best" *p*H. The Ox Eye Daisy loves lime, yet its close (though poor) relation, the Corn Marigold, stands plenty of acidity. Nearly all our crop plants do well at a *p*H of 6–6·5, although some, especially vegetable crops, are much more dependent on a reasonably high *p*H than others (Table 1). Asparagus, Lettuce, Onion and Radish like a nearly neutral soil; Carrots, Beet, Cauliflowers and all of our Beans require a *p*H above 6. Peas are not as reluctant to grow in a fairly acid soil as are Beans. Some Turnip varieties need more lime than others, but none as much as other root crops. Potatoes and Rhubarb stand reactions down to *p*H 5·1 with comparative ease.

Sometimes ornamental plants escape from cultivation and establish themselves in a position they really fancy. *Buddleia Davidii* colonized the mortar rubble (which is chemically limestone) of bomb sites, and *Kentranthus ruber* and Snapdragons often escape to flourish on the top of lime-providing walls.

Amongst many decorative herbaceous plants, however, and especially amongst both fruit-producing and ornamental trees and shrubs, a high *p*H is possibly a greater limitation than acidity. Although not many are known to need such strongly acid soils for their well-being as most Ericaceae, one has grown to expect relatively few woody plants to feel happy in a soil on the alkaline side of neutral, and is surprised at the wealth and variety of plants found thriving in COLONEL F. C. STERN'S chalk pit. One learned botanical expert (11) certainly backs up the view that many shrubs and trees do not mind a bit of lime in the least, but one suspects that purely ornamental plants can accommodate themselves to rather a wider *p*H range than hard-working plants, i.e., fruit-producing ones. Even so, experienced cultivators wisely point out that we have so many beautiful plants at our beck and call nowadays that it will be well worth one's while to study their origin and select the types most suitable for one's particular soil; here again SIR EDWARD SALISBURY (8, p. 130) comes to our assistance.

Amongst fruits, Strawberries, Raspberries, and Pears are definitely averse to anything on the alkaline side. And the time-honoured belief that stone fruits need lime has been proved untrue. Could it be that on soils rich in lime the high *p*H was praised for the success which was really due to the perfect drainage of such soils?

Lawn grasses, finally, are well known to benefit from the relatively low *p*H, between 5 and 6, which encourages the finer grasses—fine Bents and some Fescues, and discourages the coarser ones, especially Ryegrass, and also the earthworms.

CONCLUSION

What, then, does the acidity concept mean to the gardener? The answer is probably twofold: First, although there may be different "best" levels of *p*H for different species, most plants are, in many soils

and climes, tolerant to quite a wide range, often two *p*H units or more, before showing any signs of discomfort. Second, the horticultural problem radically differs from the agricultural one: our idea of a soil providing minimum conditions for success of crop plants presupposes the presence of a generous supply of humus, moisture and plant food; these by themselves widen even further the limits of the tolerated *p*H range, which in this way grows less and less critical. When things go wrong, the *p*H certainly needs watching, but it should be regarded as a symptom rather than a cause, as a barometer rather than an accurate forecast of soil and plant performance.

Words are often used loosely. Sometimes a soil is termed "sour" when something—anything—is wrong with it. But if we reserve for "sour" the meaning, almost equally arbitrary but at least excusable, of *too* acid, we may sum up by saying that an average garden soil should be just slightly acid, but no, not sour.

REFERENCES

(1) HEWITT, E. J. (1952): *Internat. Soc. Soil Sci. Comn. II & IV Trans.* 1, 107.

(2) HEWITT, E. J. (1953): *Science and Fruit.* Univ. of Bristol, 179.

(3) RUSSELL, Sir E. J. (1950): *Soil Conditions and Plant Growth.* Eighth ed., 98–107; 473–8.

(4) GARDNER, H. W. & GARNER, H. V. (1953): *The Use of Lime in British Agriculture.*

(5) MINISTRY OF AGRICULTURE AND FISHERIES (1949): *The Use of Lime in Agriculture.* Bull. No. 35, H.M.S.O.

(6) KELLEY, W. P. (1948): *Cation Exchange in Soils.* Reinhold, New York.

(7) CROWTHER, E. M. & WALKER, T. W. (1952): *Agriculture* (London), 59, 251.

(8) SALISBURY, Sir EDWARD (1952): *Downs and Dunes. Their Plant life and its Environment,* London, G. Bell & Sons, Ltd.

(9) COLHOUN, J. (1952): *Nature,* **169,** 21.

(10) MCFARLANE, I. (1952): *Ann. Appl. Biol.* **39,** 239.

(11) SMALL, J. (1946): *pH and Plants.* Baillière, Tindall & Cox, 133–47.

TABLE 1

Factors shown by sand culture experiments at Long Ashton Research Station to be important causes of injurious effects on different crops in acid soils.

	FACTORS				
	MANGANESE Excess	ALUMINIUM Excess	CALCIUM Deficiency	MAGNESIUM Deficiency	MOLYBDENUM Deficiency
Sensitive Crops	French Beans Brassicas, especially Savoys, Brussels Sprouts	Sugar Beet Carrot French Beans, certain varieties	Potato Celery Tomato	Kale	Cauliflower Broccoli Lettuce

Adapted from *Science and Fruit,* by kind permission of the University of Bristol.

TABLE 2

LIME REQUIREMENT OF SOILS

Ounces of carbonate of lime per square yard to raise pH of top six inches of soil.

Notes.

I. The figure is the maximum amount normally advisable to add; it will almost, but not quite, neutralize the soil.

II. If more than 1 lb. per sq. yd. is to be added, then add half the dressing before digging or ploughing and half after digging.

SOIL REACTION			LIME REQUIREMENT (in oz. carbonate of lime per sq. yd.)				
Description	pH	Indicator colour	Sand	Sandy Loam	Medium Loam Silt Loam	Clay Loam Peat Loam Heavy Silt	Clay Peat
Alkaline	over 7	Blue green	nil	nil	nil	nil	nil
Neutral	7–6·5	Green	nil	nil	4 oz. lime for brassicas only.		
Slightly acid	6·4–5·8	Yellow green	6–9	9–12	12–15	15–21	21–24
Acid	5·7–4·8	Orange	12–18	18–24	24–30	30–42	42–48
Extremely acid	below 4·8	Red	30–42	42–48	48	48	48

NOTES FROM FELLOWS

A note on Arum creticum Boiss. & Heldr.

THE illustration of *Arum creticum* which appears in the *Botanical Magazine*, tab. 101, vol. 167, shows a greenish inflorescence, in colour somewhat resembling *A. italicum*. The accompanying text regrets that no collector has recorded the colour of *A. creticum* except PETER DAVIS, who notes that the yellowish form with a yellow spadix, originally described, appears to give place at higher altitudes to a whitish form with a purplish spadix. Specimens which I collected last year above the village of Aperghi, Karpathos, gave me the impression of a white spathe with a prominent butter-yellow spadix. This also applies to two plants which I found growing on the top of Mt. Ataviros, Rhodes, in 1946. In the plants which I saw in Karpathos, and these were many, growing among rocks with such neighbours as *Arum nigrum*, *Colchicum latifolium* and *Paeonia Clusii*, there was no marked colour variation.

To my mind, *A. creticum* is a handsomer plant than *Calla aethiopica* and if it proves as hardy as *Arum nigrum* which flowered and increased in my open border at Kew from plants collected at St. Hilarion, Cyprus, it should prove a decorative addition to the garden. The specimens which I sent to the Royal Botanic Gardens, Kew, have already flowered (February 19) under glass, but in its native habitat, *A. creticum* flowers in March and April.

MARK OGILVIE-GRANT

25 Eaton Terrace, S.W. 1

WISLEY TRIALS, 1953

LINARIA

Seven stocks of Linaria were received for trial at Wisley during 1953. The trial was sown on April 7, 1953, in shallow drills one foot apart. The trial was inspected by a Sub-Committee of Floral Committee "A" on June 17, 1953, and on their recommendation The Council of The Royal Horticultural Society has made the following awards to Linaria. It should be noted that the plants may be cut down to within one inch of the ground after flowering and will produce a second crop of flower. The number in brackets after the description of the variety is that under which it was grown in the trial.

Flowers of Yellow Shades

FAIRY BRIDESMAID. (Raised, introduced and sent by Messrs. Watkins & Simpson, Ltd., 26–29 Drury Lane, Covent Garden, London, W.C. 2. **H.C.** June 17, 1953.—Plant 14 inches high, very vigorous, erect and compact, much branched, very free flowering. Flower stems 5 inches long. Flowers ⅜ inch across, single, Primrose Yellow (H.C.C. 601). [1]

Flowers of Red Shades

RUBY KING. (Raised, introduced and sent by Messrs. Watkins & Simpson, Ltd.) **A.M.** June 17, 1953.—Plant 18–20 inches high, very vigorous, erect and compact, much branched, very free flowering. Flower stems 10–12 inches long. Flowers ½ inch across, single, a bright velvety shade of Ruby Red (H.C.C. 827). [2]

Flowers of Violet Shades

DIADEM. (Raised, introduced and sent by Messrs. Watkins & Simpson, Ltd.) **H.C.** June 17, 1953.—Plant 14–16 inches high, very vigorous, erect and compact, much branched, very free flowering. Flower stems 6–8 inches long. Flowers ¾ inch across, single, near Amethyst Violet (H.C.C. 35) with small yellow blotch margined with cream. [3]

Flowers of Mixed Colours

FAIRY BOUQUET. (Raised, introduced and sent by Messrs. Bodger Seeds, Ltd., El Monte, California, U.S.A.) **A.M.** June 17, 1953.—Plant 16 inches high, very vigorous, erect and very compact, much branched, very free flowering. Flower stems 6–8 inches long; flowers ¾ inch across, single, colours include white, cream, yellow, pink, magenta, crimson, lilac, mauve and violet. [4]

EXCELSIOR. (Raised, introduced and sent by Messrs. Watkins & Simpson, Ltd.) **H.C.** June 17, 1953.—Plant 24 inches high, very vigorous, erect and compact, much branched, very free flowering. Flower stems 8–10 inches long. Flowers ¾ inch across, single, colours include white, yellow, pink, mauve, crimson and purple. [7]

PETUNIAS

Thirty stocks of Petunias were received for trial at Wisley in 1953. The trial was sown in 5-inch pots on March 25 and subsequently on April 10 was pricked out into boxes. The trial was planted out on May 15. The trial was inspected by a Sub-Committee of Floral Committee "A" on July 29, August 7 and 17, 1953, and on their recommendation the Council of The Royal Horticultural Society has made the following awards to Petunias.

The number in brackets after the description of the variety is that under which it was grown in the trial.

Flowers of Cream Shades

CREAM STAR. (Raised, introduced and sent by Messrs. Atlee Burpee Co., Burpee Building, Philadelphia 32, Pa., U.S.A.) **H.C.** July 29, 1953.—Plant 16–18 inches high, vigorous, compact, very free flowering. Flowers 2 inches diameter, 2⅛ inches long, cream veined greenish yellow. An even stock that stood up to the weather well. [3]

Flowers of Pink Shades

PINK SENSATION. (Raised, introduced and sent by Messrs. Atlee Burpee, Co.) **A.M.** July 29, 1953.—Plant 2 feet high, vigorous, erect, compact, very free flowering. Flowers 2¾ inches diameter, 2¼ inches long, Phlox Pink (H.C.C. 625) veined Rose Bengal (H.C.C. 25). A very even, large-flowered stock. [9]

FIRST LADY. (Raised, introduced and sent by Messrs. Wm. Macdonald Seed Co., P.O. Box 550, Santa Maria, California, U.S.A.) **H.C.** August 17, 1953.—Plant 16 inches high, vigorous, very erect, very compact, very free-flowering. Flowers 2⅛ inches diameter, 2 inches long, Fuchsine Pink (H.C.C. 627/1) fading with age to Fuchsine Pink (H.C.C. 627/2) with slightly darker veining in the throat. A neat compact stock. [10]

Flowers of Red Shades

FLAMING VELVET IMPROVED. (Raised, introduced and sent by Messrs. N. V. Sluis en Groot's Koninklijke Zaadteelt en Zaadhandel, Enkhuizen, Holland.) **A.M.** August 7, 1953.—Plant 14–16 inches high, vigorous, erect, compact, free flowering. Flowers 2¾ inches diameter, 2½ inches long, a deep velvety shade of red near Garnet Lake (H.C.C. 828). An even, large-flowered stock. [20]

SALMON GLOBE. (Raised, introduced and sent by Messrs. Bodger Seeds, Ltd., El Monte, California, U.S.A.) **A.M.** August 7, 1953.—Plant 12–14 inches high, vigorous, erect, compact, very free flowering. Flowers 2½ inches diameter, 2¼ inches long, near Cherry (H.C.C. between 722 and 722/1). A very even stock producing dwarf bushy plants. [30]

FIRE CHIEF. (Raised, introduced and sent by Messrs. Bodger Seeds, Ltd.) **H.C.** August 7, 1953.—Plant 12–14 inches high, vigorous, erect, compact, very free flowering. Flowers 2¼ inches diameter, 2 inches long, Turkey Red (H.C.C. 721/2) veined with slightly darker red. An even stock. [21]

Flowers of Violet Shades

VIOLACEA. (Sent by Messrs. L. Daehnfeldt, Ltd., Odense, Denmark.) **H.C.** August 17, 1953.—Plant 24–28 inches high, vigorous, erect, compact to slightly spreading habit, very free flowering. Flowers 3 inches diameter, 2¾ inches long, a much deeper, more velvety shade of violet than Spectrum Violet (H.C.C. 735). A strong growing stock. [28]

ENDIVE

Eleven stocks of Endive were received for trial at Wisley during 1953. The trial was sown in shallow drills 15 inches apart on June 26. The plants were thinned to 15 inches apart in the rows. The trial was inspected by a sub-committee of the Fruit and Vegetable Committee on September 4, 1953, and on its recommendation the Council of The Royal Horticultural Society

has made the following awards to Endive after trial at Wisley. The number in brackets after the description of the stock is that under which it was grown in the trial.

Leaves Entire

IMPROVED DEEPHEART. (Raised, introduced and sent by Messrs. L. Clause S.A., Brétigny-sur-Orge (S. et O.), France.) **A.M.** September 4, 1953.—Plant 6 inches high, 15 inches diameter, compact, dense; leaves 8¾ inches long, light-medium green, twisted and curled, deeply lobed; midrib ⅜ inch wide at base, fleshy, tender. [9]

FLORIDA DEEPHEART. (Raised, introduced and sent by Messrs. N. V. Sluis en Groot's Koninklijke Zaadteelt en Zaadhandel, Enkhuizen, Holland.) **A.M.** September 4, 1953.—Plant 7 inches high, 15 inches diameter, very compact, dense; leaves 8¼ inches long, light green, slightly twisted, slightly curled, lobed; midrib ¾ inch wide at base, fleshy, tender. [8]

ROSABELLA. (Raised, introduced and sent by Messrs. A. R. Zwaan & Son, Seed Growers, Voorburg, The Hague, Holland.) **A.M.** September 4, 1953.—Plant 6½ inches high, 15 inches diameter, compact, fairly dense; leaves 8½ inches long, light green, slightly twisted, lobed; midrib ⅜ inch wide at base, fleshy and tender. [6]

Leaves Divided

EXHIBITION. (Introduced and sent by Messrs. A. L. Tozer Ltd., Pyports, Church Street, Cobham, Surrey.) **A.M.** September 4, 1953.—Plant 6 inches high, 14 inches diameter, compact; leaves 6½ inches long, divided, light green; midrib ⅜ inch wide at base, fleshy, tender. [3]

LARGE RUFFEC GREEN CURLED. (Introduced and sent by Messrs. Watkins & Simpson Ltd., 26–29 Drury Lane, Covent Garden, London, W.C. 2.) **A.M.** September 4, 1953.—Plant 8 inches high, 15 inches diameter, very vigorous; leaves 10 inches long, divided, curled; midrib ½ inch wide at base. This stock would require the rows to be at least 2 feet apart for full development. [4]

GOLDEN SELF-BLANCHING CELERY

Thirteen stocks of Golden Self-Blanching Celery were received for trial at Wisley in 1953. The trial was sown in 5-inch pots on March 18 and was pricked out into boxes on April 10. The plants were hardened off and planted out on May 29 in rows 9 inches apart with 9 inches between the plants in the rows. The trial was inspected by a sub-committee of the Fruit and Vegetable Committee on September 4, 1953, and on their recommendation the Council of The Royal Horticultural Society has made the following awards to Golden Self-Blanching Celery after trial at Wisley. The number in brackets after the description of the stock is that under which it was grown in the trial.

GOLDEN PLUME. (Raised, introduced and sent by Messrs. L. Clause S.A., Brétigny-sur-Orge (S. et O.), France.) **A.M.** September 4, 1953.—Plant 30 inches high, 5½ inches diameter. Leaf stalks medium width, prominent ribs, outer creamy white, inner white. A very even stock. [2]

GOLDEN SELF-BLANCHING. (Raised, introduced and sent by Messrs. L. Clause S.A.) **A.M.** September 4, 1953.—Plant 30 inches high, 4½ inches diameter. Leaf stalks medium width, prominent ribs, outer creamy white, inner white. An even stock. [5]

GOLDEN SELF-BLANCHING. (Sent by Messrs. W. Deal & Sons Ltd., Kelvedon, Essex.) **A.M.** September 4, 1953.—Plant 27 inches high, 3½ inches diameter. Leaf stalks medium width, prominent ribs, outer creamy white, inner white. [6]

PLANTS TO WHICH AWARDS HAVE BEEN MADE IN 1953

Androsace 'Escheri' (A. chamaejasme × A. obtusifolia) A.M. April 28, 1953. Collected by the exhibitor in the Bernese Oberland, this interesting natural hybrid forms a dense mat of deep green leaf rosettes above which the umbellate inflorescence is borne on hairy stalks, 1½ in. long. At first the white flowers have a greenish-yellow eye, but this later becomes red and the petals then take on a pinkish tinge. It is very floriferous, and the flowers last a long while. It is quite hardy, but benefits from some protection with glass just before the flowers open. Exhibited by Mrs. A. N. Griffith, M.A., Paradise House, Newnham, Cambridge.

Campanula 'Pamela' (C. elatines × C. isophylla) A.M. August 11, 1953. A very beautiful hybrid, the flowers being borne in terminal clusters at the end of trailing stems 12 to 15 in. long. The flowers were Methyl Violet (H.C.C. 39/2) in colour, shading to pale greyish white in the centre, flat and with four or five broad petals, each flower measuring almost 1½ in. in diameter. Each of the eighteen stems bore about six open flowers. The pale green leaves were heart-shaped with marked veins, and about 1½ in. across. It is said to be hardy, and to be suitable for the rock garden or alpine house. Exhibited by Mrs. C. B. Saunders, Husseys, Green Street Green, Farnborough, Kent.

Ramonda Myconi A.M. May 19, 1953. As long ago as 1629 John Parkinson described and illustrated a plant which was almost certainly this old garden favourite. Better known to many as *R. pyrenaica* it is, as the name suggests, a native of the Pyrenees, though forms also occur in Serbia and Greece. The flowers vary considerably in colour and width of petals, but in the specimen shown the colour was Mineral Violet (H.C.C. 635/2), with a yellowish ring tinged with orange at the base of the petals. There were fifteen flower stalks, each bearing two to six flowers, the diameter of each flower being 1½ in. The leaves are broadly ovate, crenate, corrugated and fringed with brown hairs, forming a flat rosette. Exhibited by E. W. Sandford, Esq., 99 Leander Road, Thornton Heath, Surrey.

Saxifraga 'Southside Seedling' A.M. May 19, 1953. This striking plant is one of the Section Euaizoonia. Above a rosette of leaves 4 in. across, the graceful flower stems, 15 in. in height, bear masses of white flowers, heavily blotched and spotted with dull crimson, particularly towards the center. It is claimed to be the most heavily

marked hybrid of its type. The individual flowers are $\frac{5}{8}$ in. across, and the stems and leaf stalks are covered with glandular hairs. Exhibited by Messrs. W. E. Th. Ingwersen, Ltd., Birch Farm Nursery, East Grinstead, Sussex.

Serapias cordigera A.M. April 28, 1953. An attractive species for the cool or alpine house, this terrestial Orchid is a native of a large part of southern Europe and northern Africa. The plant is about 1 foot high, and the most conspicuous part of the flower is the labellum, $1\frac{1}{4}$ in. long, $\frac{3}{4}$ in. wide and distinctly veined, the colour being Purple Madder (H.C.C. 1028). The lower leaves are 4 to 6 in. long and spotted with purple at the base, where they clasp the stem. The upper leaves also have purple spots. Exhibited by the Director, The University Botanic Garden, Cambridge.

Verbascum dumulosum A.M. April 28, 1953. A small shrub about a foot high, this plant was introduced from Southern Turkey by Mr. Peter Davis in 1950. The specimen shown bore about fifteen short flower spikes covered with flowers of a clear deep Sulphur Yellow (H.C.C. 1/1), the petals being tinged with dark crimson at the base. Each flower was just over 1 in. across. The greyish-white, felted leaves were oval, pointed and, including the short petioles, were about $3\frac{1}{2}$ to 4 in. long. It should make a good plant for the alpine house. Exhibited by W. V. Bishop, Esq., Parks Dept., Municipal Offices, Harrogate.

Verbascum Pestallozae A.M. May 19, 1953. This interesting plant was introduced from Western Anatolia by Mr. Peter Davis in 1949. The leaves and stems are densely tomentose, the latter being 8 to 10 in. high, of which the flowering portion occupies 6 in. The flowers, $1\frac{1}{2}$ in. in diameter, are Dresden Yellow (H.C.C. 64/1) in colour, the very hairy stamens deep orange, and the pistil green. Each flower spike bears up to a dozen fully open flowers at one time. The plant is perennial, and has hitherto proved hardy in the open garden in Kent. Exhibited by Mrs. C. B. Saunders, Husseys, Green Street Green, Farnborough, Kent.

TREES AND SHRUBS

Arbutus × andrachnoides. A.M. December 1, 1953. A hybrid between *A. Andrachne* and *A. Unedo*, found wild in Greece where both parent species occur, and perhaps also raised in cultivation. It forms a large shrub or small, smooth-barked tree with more or less elliptical, toothed, evergreen leaves averaging 4 inches in length and $1\frac{1}{2}$ inch in width, but varying greatly in different specimens. The red-stalked flowers appear in late autumn in dense pendulous panicles at the tips of the branchlets. The waxy, urn-shaped corolla is $\frac{1}{3}$ inch long, white, tipped with light Sap Green (H.C.C. 62/2). Exhibited by Lord Aberconway and the National Trust, Bodnant, North Wales.

Berberis Prattii A.M. November 3, 1953. This species was first collected by Pratt in Szechwan and later by Wilson, and a fruiting spray

from one of the early introductions was figured in the *Botanical Magazine* at t. 8549 (1914). The somewhat mediocre plant represented there would scarcely deserve an award, and it cannot be compared in beauty or grace with the specimens exhibited, which bore freely-branched pendulous panicles up to 8 inches long displaying a heavy crop of slightly bloomy ovoid berries about ¼ inch long, ranging in colour from coral pink to light scarlet. The old plant from which they came was raised from Wilson's seed, and is at present 12 feet high and 18 feet across. It was exhibited as *B. polyantha*, a closely allied but rare species, by E. H. M. Cox, Esq., Glendoick, Perth.

Cotoneaster conspicua var. decora F.C.C. October 20, 1953. The species *C. conspicua* was introduced to cultivation by seeds collected by Kingdon Ward in S.E. Tibet in 1924. The form which received the Award of Merit in 1933 is an erect growing plant reaching a height of 6 to 8 feet. The variety *decora* forms a large rounded hummock of arching and pendulous branches clothed with elliptic or oblanceolate, dark green, more or less persistent leaves about ½ inch long. In the spring all the young growths are covered with white, slightly pink-flushed, blossoms ½ inch wide, and these are succeeded by heavy crops of large globose scarlet berries which ripen in September and remain effective until the following February. Exhibited by Col. F. C. Stern, O.B.E., M.C., F.L.S., V.M.H., Highdown, Goring-by-Sea.

Euonymus grandiflorus forma salicifolius A.M. October 20, 1953. A shrub or small tree native to the Himalaya and Western China, hardy at least in the South of England. The linear-lanceolate leaves, usually 3 to 4 inches long, will persist through the winter in sheltered gardens. The rather small, greenish-white, four-petalled flowers are somewhat inconspicuous, and the merit of the plant lies in the fruits which hang in slender-stalked bunches from the lower parts of the branchlets. The fruit is a capsule ½ inch long and rather wider composed of four fleshy rose-flushed lobes which separate to expose the scarlet seeds. Exhibited by Col. F. C. Stern, O.B.E., M.C., F.L.S., V.M.H., Highdown, Goring-by-Sea.

Mahonia acanthifolia A.M. November 3, 1953. A very handsome evergreen shrub, native of China, and hardy in the South and West of the British Isles. The massive leaf is 2 feet or more in length and has a stiff rachis bearing about twenty-nine leaflets, the middle ones being 3½ inches long, 1¾ inch wide, ovate, sinuate-serrate, glossy and conspicuously veined. The specimen shown bore a terminal bunch of sixteen spreading racemes 10 inches in length, densely set with Mimosa Yellow (H.C.C. 602) flowers ¾ inch across. Exhibited by the Commissioners of Crown Lands, Windsor Great Park, Berks.

Malus × Eleyi 'Neville Copeman' A.M. October 6, 1953. This very ornamental Crab was raised by Mr. T. N. S. Copeman at Roydon Hall, Diss, Norfolk, from a pip taken from a fruit of *Malus × Eleyi*. The fruits, which are carried up to six together on leafy spurs, are roundish-oblong, 1¼ inch long, Mandarin Red (H.C.C. 17/1) flushed

with crimson on their more exposed sides. Exhibited by Messrs. R. C. Notcutt, Ltd., Woodbridge, Suffolk.

Rhododendron 'Gloriana' A.M. June 9, 1953. A single, shapely flower head of this striking hybrid from the crossing of R. 'Fabia' and R. 'Goldsworth Orange' was shown. Twelve flowers made up the lax flat-topped truss. The corolla was shallow funnel-campanulate in shape and brightly coloured a variable shade of between Claret Rose (H.C.C. 021/1) and Empire Rose (H.C.C. 0621/1) and suffused in the throat with an orange tinge and some spotting. Exhibited by The Director, R.H.S. Gardens, Wisley, Ripley, Surrey.

Rosa virginiana A.M. October 20, 1953. This deciduous North American species has long been grown in British gardens, where it forms a bush up to 6 feet tall with pink flowers 2½ inches across. The award is given for its effect in autumn, when the leaves assume warm tones of orange and red and the round, blood-red fruits hang like small Cherries in clusters of six or so. Exhibited by Messrs. Geo. Jackman & Son (Woking Nurseries), Ltd., Woking.

Schima khasiana A.M. October 20, 1953. An evergreen tree occurring in the wild state in Assam, Burma and China, introduced by Forrest from N.W. Yunnan. It is only completely hardy in very favoured localities, and in some Cornish gardens it has attained a height of 40 feet. It has dark green, lustrous, elliptic leaves up to 6 or 7 inches long, and from the axils of the uppermost leaves it produces solitary flowers on stout pedicels 2 or 3 inches long. The flower, which somewhat resembles a single Camellia 2 inches in diameter, has five concave white petals and a dense central mass of deep yellow stamens. Exhibited by The Rt. Hon. Charles Williams, M.P., Caerhays Castle, Cornwall.

Sorbus pinnatifida Gibbsii A.M. September 8, 1953. A very good form of the hybrid between *S. Aucuparia* and *S. intermedia*, perhaps more correctly called *S. hybrida*. It is a deciduous tree with oblong leaves about 4 inches long, more or less deeply pinnately lobed, with often a few separate leaflets near the base. The berries, which are about ½ inch across and coloured Dutch Vermilion (H.C.C. 717) are carried in heavy, flattish clusters. Exhibited by Messrs. Knap Hill Nursery, Ltd., Woking.

BOOK NOTES

"Flora of Malaya. Vol. I. Orchids." By Prof. R. E. Holttum. 753 pp. Illus. (Published under the auspices of the Botanic Gardens, Singapore.) $20 Straits.

The book here reviewed is the first volume of a projected new Flora of Malaya, designed to replace Ridley's *Flora of the Malay Peninsula*, published about thirty years ago and now in many respects out of date. This "Flora" will be of especial interest to horticulturists since it is proposed to include, in addition to the native plants, all the more important plants cultivated in the region. Naturally these plants cannot be given the same detailed treatment as the indigenous species, but judging from the first volume, a great deal of very useful information is being included.

For this volume the family *Orchidaceae* has been chosen, a happy choice in view of the important position which the Orchids occupy among cultivated tropical plants and the wide appeal which they make to people of many varying interests. The author, Professor Holttum, has not only a first-class knowledge of the native Malayan species, but has also taken an active part in the development of new hybrids in Singapore where for many years he was Director of the Botanic Gardens.

The main part of the book follows the usual practice of a regional "Flora," with clear generic and specific descriptions, and well-constructed keys for the identification of the various groups and species. Native and cultivated species of Malaysian genera are keyed out together, which has considerable advantages, but the descriptions of the cultivated species are necessarily less detailed. The descriptions are supplemented by over 230 line drawings, mostly by the author, which show clearly the important diagnostic features.

There are also introductory chapters on the vegetative and floral characters of Orchids, with special reference to Malayan species, and on classification, hybridization and geographical distribution. Of special interest to horticulturists are chapters on the general cultivation of Orchids in the tropics and on the raising of Orchids from seed by modern methods, this chapter being written in conjunction with Mr. J. L. Pestana.

Apart from these special chapters there is a great deal of information about cultivated species and their cultivation, under the various genera concerned. These include not only the Malaysian genera but also American groups such as *Cattleya*, *Oncidium*, etc. Owing to the continuously hot damp climate of Malaya it is scarcely possible to grow successfully some of the Orchid genera more popular in Europe, such as *Odontoglossum*, *Miltonia* and *Cymbidium*, except to a limited extent in the hill stations. A number of other groups are being experimented with extensively in tropical countries, particularly certain sections of *Dendrobium*, *Spathoglottis* and the large group of monopodial Orchids including *Vanda*, *Arachnis*, *Renanthera* and *Phalaenopsis*. Professor Holttum describes the more important hybrids which have been produced or cultivated in Malaya and readers will find this a very up-to-date account of these plants. The four coloured plates illustrate some of the more striking forms mentioned in the text.

Altogether the author has written a most attractive book, invaluable to anyone who wishes to study the native Orchids of Malaya and providing much useful information for those interested in Orchid growing in tropical countries.

V. S. SUMMERHAYES

"Soil Microbiology." By S. A. Waksman. 356 pp. Illus. (John Wiley and Sons Inc. Chapman and Hall Ltd.) 48s.

This is a very well documented and pleasantly written account of many aspects of soil microbiology so selected and arranged as to cover the important aspects of this extensive and growing field of science. As the author states in his preface not all sections are treated in equal detail, but ample references are given to reviews from which more extensive and intensive information can be obtained.

Passing from an historical account of the evolution and the establishment of soil microbiology as a separate scientific discipline, the author discusses many of the methods of isolating and studying the soil population, and examines our knowledge of the activities of micro-organisms in decomposing animal and vegetable remains in the soil. This leads to consideration of the humus fraction and its importance in soil economy, to discussions of the nitrogen relationships of soils, particularly nitrogen fixation, and to diverse mineral transformations occurring in soils. The latter section, though much condensed, is of value in several directions and deals with a topic of considerable present interest.

The remaining chapters concern more strictly biological aspects of the soil dealing with phenomena associated with the rhizosphere, including the influence of the plant root system on its composition and of the population of micro-organisms on higher plant growth. Discussions of antagonism amongst the soil population provides a concise and clear account not only of general problems but also of specific antibioses and of antibiotics. Examination of survival of pathogenic organisms in soil embraces consideration of the control of plant pathogenic organisms by biological and chemical methods, of manures and composts, and of the bearing of the micro-organisms in relation to soil fertility. A final section of recent developments in soil microbiology sketches the lines along which the science is progressing. The author is at pains to point out that the foundations have been laid on which a superstructure must be built by workers of the future, but this can only be achieved by the combined labours of scientists of the widest possible training in biological and chemical disciplines. He leaves us with a quite clear picture of soil microbiology as an ecological venture requiring numerous skills for the solution of the problems it poses.

This is a book not only for the student of biology but also for the scientist and the layman with an interest in the earth on and by which we live. The author is to be congratulated on the easy and readable style in which the work is written, and the publishers on the very pleasant format and excellent printing of the book.

C. G. C. CHESTERS

"The British Delphinium Society's Year Book 1954." Edited by Ronald Parrett and Montague Lacey. Demy 8vo. 160 pp. Illus. (The British Delphinium Society.) *7s. 6d.*

This year the *Delphinium Year Book* appears in a new guise. There is a fine colour plate of a close-up of Delphinium 'Charles Langdon' bled over the cover, while inside we even find cartoons by Osbert Lancaster and others. Delphiniums have always proved difficult to photograph effectively but the many close-up photographs by Arthur Hunt of small portions of the spikes are extremely good. Those of the whole spike are less effective but the difficulty is relatively greater. There are a number of useful articles discussing the new varieties seen at the Delphinium Show, at the Wisley Trials and in the gardens of members of the Delphinium Society while the practical side is well covered by an excellent article lavishly illustrated on propagation by cuttings and a manual for beginners by Mr. Parrett, one of the editors, while I also found interesting the articles on Delphinium breeding by Brian Langdon and Frank Bishop. The editors are to be congratulated on the production of an attractive, useful and stimulating volume.

PATRICK M. SYNGE

"Amateur Gardening Diary and Horticultural Directory, 1954." Compiled by A. G. L. Hellyer. (Collingridge.) *3s. 6d.*

This is a desk diary rather than a pocket one and its preliminary pages contain a great deal of carefully selected and useful horticultural information, not gathered together in a similar way in any other place as far as I know. There are full lists with addresses of all the Horticultural Societies, Associations and Government Departments concerned with Horticulture or Horticultural Education and these latter are now very numerous. There is a well selected book-list and a comprehensive trade directory. The footnotes to the Diary pages are practical and should serve as useful reminders even to the experienced gardener.

PATRICK M. SYNGE

ORDERS FOR BOOKS

The Society does not sell any publications other than its own. Orders for books reviewed should therefore be sent direct to the booksellers and not to the offices of the Society.

The contents of this volume are copyright. For permission to reproduce any of the articles application should be made to the Council.

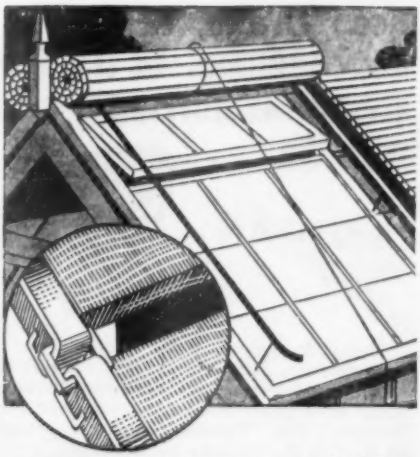
SPRAYING

The "ECLAIR" No. 1A

fitted with single nozzle and angle bend, is suitable for applying all usual insecticide and fungicide washes. Has a 3½ gallon copper tank fitted with strainer and lid, 2' 7½" special hose, and 22" Spray Lance with strainer. Weight 14 lb. Price £12 18s. 0d.

Catalogue from:—

COOPER, PEGLER & CO. LTD.
P.O. Box No. 9-67
BURGESS HILL, SUSSEX

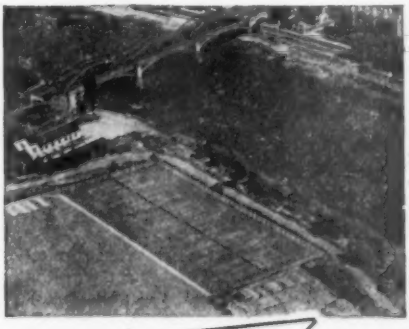


CHAIN LATH BLINDS for GREENHOUSES . . .

Essential for quality produce

Makers and Patentees:

TIDMARSH & SONS
Laycock Street, London, N.1



FOR 30 YEARS
THE SURFACE FOR SERVICE

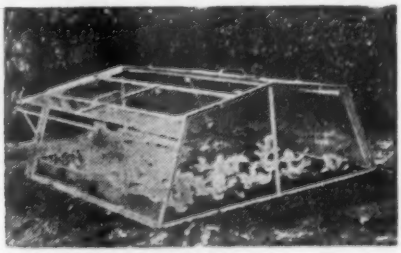
SIX COURTS, RIVERSIDE LANDS, CHISWICK
(With acknowledgment to the Middlesex County Council.)

BAFSC

SPECIALISTS IN SPORTS GROUNDS AND TENNIS COURTS

GRASSPHALTE LTD

HAMPTON HILL, MIDDLESEX. *Molesey 5167 & 3799*



"PLUIE MINOR" FRAME

THE PERFECT FRAME

Ensures PERFECT VENTILATION—So necessary to prevent condensation and damping off. Size 41" long × 38" wide × 15¼" high. Special features include:—

★Strong steel—⅛" thick. ★Cold galvanised.
★Top can be opened both sides instantly by handles.
★Sliding glass top and sides (no putty).
★No loose clips or screws.
★Can be extended without extra ends.

1 frame complete with glass **£5 10s.**
Carr. 5/- extra

Before purchasing a frame make sure you see the "Pluie Minor." It is worth waiting for.

See Stands numbers 50 and 39 at the Chelsea Show

POULTMURE LTD. (Dept. R.H.S.)
5 COLLEGE ROAD, HARROW, MIDDLESEX.

Keep LAWNS, BEDS and BORDERS in TIP-TOP CONDITION with the

'RAINFAN'

Dry spells cannot mar your efforts to make your garden a 'show piece' If you invest in a 'Rainfan,' for then you can provide adequate water throughout the season, whatever the weather. The 'Rainfan' waters a *square* 50 ft. × 50 ft., entirely automatically, from the mains supply. PORTABLE, RUST PROOF AND LASTS A LIFETIME.

Price £9 · 16 · 0

Carriage and packing 4/- extra

Fully illustrated leaflet available on request

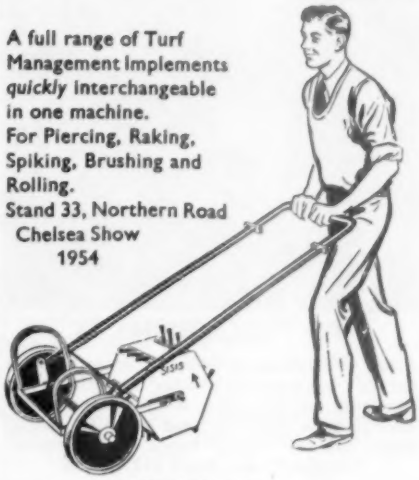
BRITISH OVERHEAD IRRIGATION LTD.

UPPER HALLIFORD · SHEPPERTON · MIDDLESEX

Tel. : Sunbury 3077/8 *Grams : Irrigation, Shepperton*

"SISIS" REGD HAND TURFMAN

A full range of Turf Management Implements *quickly* interchangeable in one machine.
For Piercing, Raking, Spiking, Brushing and Rolling.
Stand 33, Northern Road
Chelsea Show
1954



Full Particulars from :—

W. HARGREAVES & CO. LTD.

"SISIS" Works, Cheadle, Cheshire

THE FINEST THING "ON EARTH" FOR KILLING **SLUGS & SNAILS!**

SLUGIT!

THE REVOLUTIONARY NEW ***LIQUID*** **SLUG KILLER!**

"Slugit!" is a contact poison, deadly to slugs and snails, yet harmless to man, domestic animals and the tenderest plants. Diluted with water, it is applied by watering can or sprayer to the entire area to be protected, making the ground lethal to these pests. Simple, cheap and highly effective, the 4 oz. bottle treats 40 sq. yards. Get some to-day!

4 oz. BOTTLE **2/-** 8 oz. BOTTLE **3/6**

Obtainable from Seedsmen and good class Ironmongers. Larger sizes available.

The MURPHY CHEMICAL Co. Ltd.

WHEATHAMPSTEAD · · HERTS.

Getting Down To Earth!

FLEXIBLE EARTH

is the complete organic soil conditioner. Its invigorating action promotes healthier and sturdier plant growth plus Bigger and Better Crops.
Gardeners throughout the country send us their letters of appreciation.

"PERFECT"

G. Barton, of Withington House Gardens, Nr. Cheltenham, Glos., writes 2/4/49 —Flexible Earth I would think is as near perfect as anything we have in this country, quite different to any of the John Innes composts.

"I AM DELIGHTED"

I bought 14 lbs. of your Flexible Earth a few weeks ago and I am delighted with it. Will you please send me 14 lbs. more as soon as you can. I enclose P.O. for 6/6. —E. R., Barnes Common, S.W. 13. 19/1/47.

14 lb. 6/6 28 lb. 13/- 56 lb. £1.2.6 1 cwt. £2.0.0

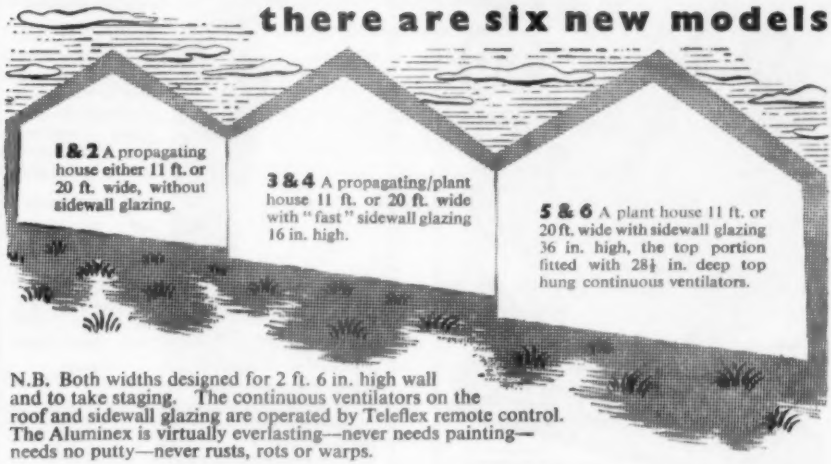
Carriage paid nearest station or post paid home where possible. Cash with order.
Buy from your local dealer, or if in difficulty send a 1/- stamp and a large envelope for 48 page booklet explaining the secret of how to win prizes. 1/- refunded against subsequent order.

THE CORNISH FLEXIBLE EARTH CO.,

52 LANIVET, BODMIN, CORNWALL

London Showrooms: 52 The Cornish Jungle, 228 Strand, (Opposite Law Courts). Central 8195.

ALUMINEX GREENHOUSES HARDLY COST A PENNY UPKEEP—and now there are six new models


1 & 2 A propagating house either 11 ft. or 20 ft. wide, without sidewall glazing.
3 & 4 A propagating/plant house 11 ft. or 20 ft. wide with "fast" sidewall glazing 16 in. high.
5 & 6 A plant house 11 ft. or 20 ft. wide with sidewall glazing 36 in. high, the top portion fitted with 28½ in. deep top hung continuous ventilators.

N.B. Both widths designed for 2 ft. 6 in. high wall and to take staging. The continuous ventilators on the roof and sidewall glazing are operated by Teleflex remote control. The Aluminex is virtually everlasting—never needs painting—needs no putty—never rusts, rots or warps.

ALUMINEX For a fully illustrated 18 page Brochure, write to: Dept. 47, 36 High Holborn, London, W.C.1.

A Great Plant Food Triumph!

SANGRAL

TEN-DAY FERTILISER

is now in BOTTLES

IN CONCENTRATED LIQUID FORM!

JUST ADD TO WATER . . THEN USE

SANGRAL the ORGANIC BASE BALANCED "FEED" containing
NITROGEN, POTASH *and* PHOSPHATES *plus* BORON
MAGNESIUM, MANGANESE *and* IRON

2/- BOTTLE MAKES 64 GALLONS
3/6 BOTTLE MAKES 128 GALLONS
Ready for Instant Use

SANGRAL IS ALSO OBTAINABLE IN
8d. PACKETS
2/6, 5/- & 12/6 CARTONS
For Those who Prefer to Mix Their Own

Dobbie's SEEDS

for RELIABILITY

For details write for our SEED & PLANT CATALOGUE Sent on receipt of 2½d stamp

DOBBIE & CO · LTD

Nurserymen and Seedsmen, EDINBURGH · 7

COOK'S "Norwich" BRUSHES

Garden Fancies

321

LAWN BROOM

This is not an ordinary bass broom, it is narrow with one or two rows of selected fibre for Lawn Aeration. Can also be used for Leaves and Paths.

321 Single Row

16"	21"	27"*
8/3	10/6	16/6

322 Double Row

12" (Ladies)		8/3
16"	21"*	27"*
10/6	16/6	21/-

* Stays.

All Complete with Handles and Carriage Paid.

COOK'S AT CHELSEA

Stand 22, Eastern Avenue

Exhibit of Horticulture Brushware.

Are there any

POTHOLES

OR WORN PLACES

in Your **PATHS –**

DRIVE OR FORECOURT?

Then use MENDAROAD, the simple self-applied asphaltic material which can be Laid Cold with ordinary garden tools. Each bag is a complete unit providing a hard impervious surface ready for immediate use.

29/6 per cwt.

Packed in ¼ cwt. bags.

Carriage paid.

MENDAROAD

DO IT YOURSELF – AT A QUARTER THE COST

GEO. A WEBSTER LTD.

3 BUCKINGHAM PLACE, LONDON, S.W. 1

OAKWORTH

DOUBLE 'Z' MODEL

NOW only **£17-15-6**

Oak & Steel construction

ensures tremendous strength and maximum light

Scientifically designed to grow more and last a lifetime. Wide range of types and sizes made in prefabricated units. All models extendible. Free Delivery. Erection Service.

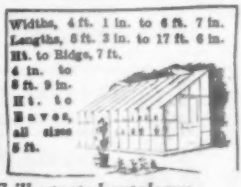
Deferred Terms gladly arranged

LEAN-TO SERIES

STRAIGHT SIDES

MODEL 'D' SERIES

8 ft. 9 in. wide. Lengths from 7ft. 11in. to 19ft. 2in.



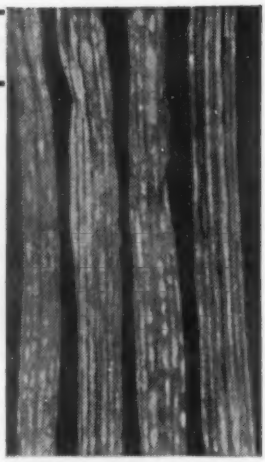
Widths, 4 ft. 1 in. to 6 ft. 7 in. Lengths, 8 ft. 3 in. to 17 ft. 6 in. Hts. to Ridge, 7 ft. 4 in. to 8 ft. 9 in. Hts. to Eaves, all sizes 5 ft.

Send for FREE illustrated catalogue.

CASTOS LTD., Dept. JRH, WELLINGTON, SALOP

plants need manganese

Since 1928, when Australian workers finally established that 'grey speck' disease of oats (here illustrated) was due to deficiency of available manganese, the occurrence of the deficiency has been recorded in a large variety of plants in many countries of the world. Among cereals, oats are most susceptible to the deficiency, and the characteristic intervenal chlorotic 'streaks' or 'stripes' are familiar to many farmers in this country and abroad.



Courtesy of Professor E. A. Jamalainen, Agricultural Experiment Station, Tikkurila, Finland

A descriptive leaflet — Manganese for Plants and Animals—may be obtained from our Agricultural Department.

You should consult your merchant about supplies of manganese sulphate without delay. If he cannot help, please communicate with us.

CHEMICAL & CARBON PRODUCTS LTD.
24F 51 GEORGE STREET HANOVER SQUARE LONDON W1
Telephone MAYfair 7122 Cables CHEMICARBO LONDON

STRAWSON TIMBER-FRAMED GREENHOUSES

ARE WARMER, KINDER TO ALL PLANT LIFE

See our Exhibits at Chelsea Show May 25th – 28th

"There is hardly anything in the world that some men cannot make a little worse and sell a little cheaper, and the people who consider prices only are these men's legitimate prey. The sweetness of low prices is lost by the bitterness of poor quality."—*Ruskin.*

Write for List RHJ.54. A wide selection of Garden Frames, Greenhouse Boilers, and 25,000 pipes, valves and fittings of every size always in stock. Chain Lath Blinds—the Greenhouse shading 'par excellence'—made to order.

G. F. STRAWSON & SON

BUILDERS OF FINE GREENHOUSES SINCE 1892

HORLEY — SURREY

Telephone : Horley 130

PRECISION
SQUARE AREA WATERING
with a BROSSON

Photo. Hampton Plant Co.

IDEAL FOR THE LAWNS AND FLOWER BEDS

The Brosson rainer will water a square or rectangular area up to 60 ft. × 60 ft. evenly and without waste. It can be easily adjusted to avoid wetting paths, walls etc., and is robustly made to stand up to long, hard working conditions. Price delivered: with spiked stand £10 10s.: with square lawn stand £11.

AVOID THIS WASTEFUL Overlapping.

Easily adjusted Area control Nowet wallsetc.

Slow oscillation ensures deep, even penetration.

THE ORIGINAL SQUARE AREA RAINER
A WRITTEN GUARANTEE with every Rainer.
Write for full details and name of nearest stockist to:—
BROSTROM-GRIFFITHS LTD.
72, Victoria Road, Surbiton, Surrey. Tel. Elmbridge 8110

GROW
ORCHIDS

FOR PROFIT AND PLEASURE!

...without the slightest difficulty you can successfully cultivate Orchids. Last year an Amateur Orchid Grower sold over £300 worth of Cymbidium flowers out of his medium-sized Greenhouse — You can do this! Send now for Free 2-colour Booklet 'The Simplicity of Orchid Growing.'

MANSELL & HATCHER LTD.
Dept. R.H., Cragg Wood Nurseries
RAWDON, LEEDS, Yorkshire

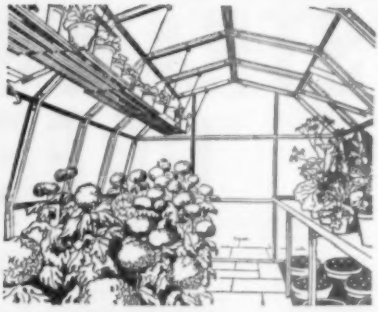
THE
Chiltern Tree Surgeons

•

Specialists in the preservation of mature and ornamental trees. Lopping and felling of dangerous trees.

•

27 QUEEN COURT
QUEEN SQUARE, W.C.1
TERMINUS 8394

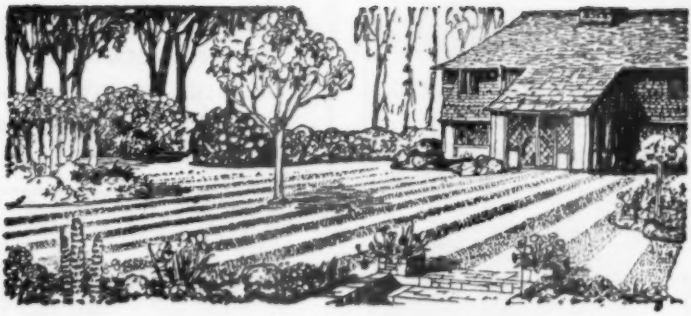


The Glasshouse you've been waiting for

THE HARTLEY 9 SEMI-DODEKAGON

The Hartley Semi-Dodekagon '9' glasshouse with glass to ground is available 9 feet wide to any length. Built in Aluminium Alloy. Enquiries for the above or our larger glasshouses will receive our prompt attention.

V. & N. HARTLEY LTD., GREENFIELD, Nr. OLDHAM
Awarded Gold Medal for commercial glasshouses, Southport Flower Show 1953



Now's the time to improve that lawn

Weeds disfigure a lawn and choke grass-growth. Chemical weed-killers are effective but do not improve the grass by themselves. VELVAS TONIC LAWN SAND is incomparable as a weed eradicator *and* stimulant to vigorous, rich-coloured grass growth. The unique process of manufacture gives VELVAS unquestioned advantages over crude sand and chemical mixtures. Use at 4 ounces per square yard from now onwards.

VELVAS

TONIC LAWN SAND

3 lbs 3/- 7 lbs 5/- 1 cwt 37/6

Obtainable from your usual Garden Sundriesmen

PAN BRITANNICA INDUSTRIES LTD

Waltham Abbey, Essex

Bio

BIOMISATION FLUID

Do you want bumper crops?

Then feed your plants with BIO FLUID, organic-based plant food. A tablespoonful in a gallon of water fortnightly makes a **HUGE** difference to your garden.

Ask your stockist for details and FREE copy of "BIO NEWS"

Bio *Feeds plants NATURALLY*

ECLIPSE SEDGE PEAT
CHELSEA SHOW

Supplies are available for quantities of 1 cwt. to 5 tons or more for exhibitors. Write or 'phone for prices for deliveries to site in the Show. We are exhibiting at Stand No. 31 Eastern Avenue.

THE ECLIPSE PEAT COMPANY LTD.
ASHCOTT, SOMERSET
Telephone: MEARE HEATH 282

WILLIAM LORD (LEEDS) LTD.
WETHERBY ROAD
BARDSEY, NEAR LEEDS

LARGE SELECTION OF FIRST CLASS SUMMER BEDDING PLANTS.

LIST BY RETURN.

ALSO ROCK AND HERBACEOUS PLANTS.

Conservatories,

Garden Dens...

Garages, greenhouses, loose-boxes and garden buildings of all descriptions.

Please send for illustrated catalogue.

ALPHA WOODCRAFT LTD.,
Dept. 24, Gutteridge St., Hillingdon Heath, Uxbridge, Middx. *Tel. HAYes 0657*

ALLWOOD'S CARNATION FLOWERS

are the ideal gift for all occasions.

Selected colours or unique mixed shades.

From:
1 gn. to 5 gns.
per box

Write for Catalogue

Allwood Bros LTD.
Carnation Specialists

R.H.S. Cut Flower Dept.
HAYWARDS HEATH
SUSSEX

KETTERING LOAM

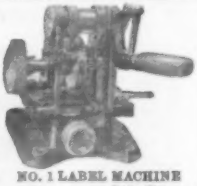
As supplied for over 30 years to the Leading Horticulturists. Hand Dug Yellow Fibrous, from our own virgin fields. Also Bedfordshire Silver Sand, and Noted Nottingham Marl.

Quotations for any quantity, delivered by Rail, or Road Transport to your door.

KETTERING FUEL CO. LTD.
28a STATION RD., KETTERING, NORTHANTS
Telephone: 3059

'SERPENT'
INDELIBLE (LEAD)
LABELS
LAST 100 YEARS

NEAT, LEGIBLE, SELF-AFFIXING, ADAPTABLE, COMPLETELY RELIABLE



NO. 1 LABEL MACHINE

Printed with *any* (different) names, 3/6 Dozen; 27/- 100. Label-printing Machines from £3 12s. 6d. Send for lists and FREE SAMPLE (*any* name). Complete Label-machine Outfits, from £4 15s. 6d., make IDEAL GIFTS

SERPENT LABEL WORKS
ROCKBEER, EXETER

LANDSCAPE OR FORMAL

GARDENS

Designed and constructed by craftsmen complete with planting schemes

Write for illustrated brochure

FITZPATRICK & SON (CONTRACTORS) LTD.
Landscape Gardens Department
445, OLD FORD ROAD, LONDON, E.3

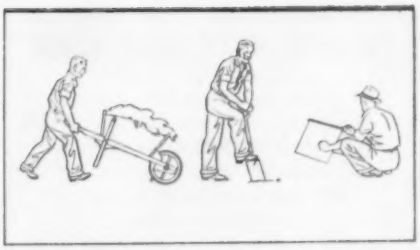
FINEST SURREY

TURF LOAM

Sterilized Soils and Composts to John Innes Formula.

Particulars Free:

JOHNSTON BROS.
NEW PARK, CRANLEIGH



Indispensable GARDENING BOOKS

THE GREENHOUSE 42/-
F. G. Preston, M.A., V.M.H., A.H.R.H.S.

THE COMPLETE BOOK OF GARDENING .. 35/-
J. Coutts, A. Edwards and A. Osborn of Kew.

LANDSCAPE GARDENING .. 30/-
Richard Sudell, F.I.L.A.

FRUIT GROWING 25/-
Edited by N. B. Bagenal, B.A. (Cantab.)

SHRUBS AND TREES FOR THE GARDEN .. 25/-
A. Osborn, M.B.E., A.H.R.H.S.
(Formerly in charge of the Arboretum, Kew.)

THE BEE-KEEPERS HANDBOOK .. 21/-
Herbert Mace
(Editor of "The Beekeeping Annual.")

CHRYSANTHEMUMS 15/-
Frank Kyle, F.N.C.S.

SWEET PEAS 15/-
E. R. Janes, A.H.R.H.S., F.N.S.P.S.

ROCK GARDENS 15/-
A. Edwards
(Formerly in charge of the Rock Garden, Kew.)

VEGETABLE GROWING 15/-
C. E. Pearson, N.D.A.

PRUNING 12/6
Edited by A. Osborn, M.B.E., A.H.R.H.S. and N. B. Bagenal, B.A. (Cantab.)

THE LABOUR SAVING GARDEN .. 6/-
Richard Sudell, F.I.L.A.

Write for complete Gardening Books Catalogue to the address below

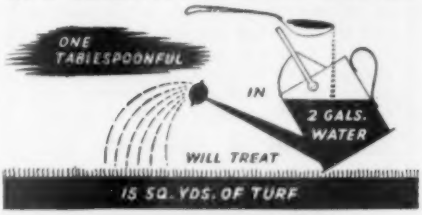
WARD LOCK

WARD LOCK & CO., LIMITED,
DEPT. (RH), PRETORIA ROAD, LONDON, N.18

'DICOTOX'

trade mark *brand*

2:4-D SELECTIVE LAWN WEEDKILLER

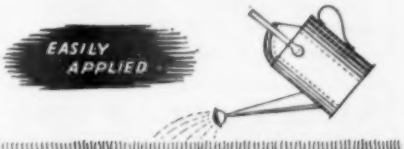


ERADICATES MOST COMMON TURF WEEDS

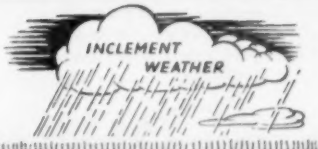
Calendar

JAN	FEB	MARCH	APRIL
MAY	JUNE	JULY	AUG
SEP	OCT	NOV	DEC

CAN BE USED THROUGHOUT THE GROWING SEASON



A WATERING CAN WILL SERVE



RARELY AFFECTS RESULTS

Container	Sufficient to treat
6 fl. oz. bottle (3s. 3d.)	1600 sq. ft.
12 fl. oz. bottle (6s. 0d.)	360 sq. yds.
1 quart tin (17s. 6d.)	1200 sq. yds.
1 gallon tin (60s. 0d.)	4800 sq. yds.
5 gallon drum (185s. 0d.)	5 acres.

Approved by Ministry of Agriculture
AN **M&B** *brand* HORTICULTURAL PRODUCT
manufactured by
MAY & BAKER LTD
Dagenham · ILFord 3060 · Extension 72
HA247

DEPENDABILITY COUNTS

"Burkwoodii" stands for the hallmark of reliability in Shrubs, while service and efficiency are our watchwords.

Seek out our Shrub exhibit *inside* the marquee at the Chelsea Show and order with confidence. Prompt and courteous attention guaranteed by :—

Burkwood & Skipwith Ltd.

Park Road Nurseries, Kingston, Surrey

Telephone : KIN 0296

TARRY'S KETTERING LOAM

Finest top spit taken from our own virgin fields. Also sterilized soil and compost to the John Innes Formula. Quotations by return for delivery in 7/8 ton lorry loads or by rail in small quantities.

V. TARRY

PYTCHLEY LODGE, KETTERING

Telephone : KETTERING 4061

SUDBURY SUFFOLK — 2 miles . . .

FOR SALE : Charming Modern Residence in sheltered position on sunny hillside with unusually **interesting garden** (about ⅔ acre). Extensive unspoilt views over beautiful Stour Valley (Constable's Country). 2 reception rooms, tiled kitchen, cloakroom, W.C., garden room, 4/5 bedrooms, bathroom, separate W.C. Central Heating; Main Electricity and Water; Garage. Quarter mile from main road bus route. A really choice property for a garden lover. Owner now invites offers: possession on completion. Particulars BOARDMAN & OLIVER, Estate Agents, Sudbury, Suffolk. Telephone 2247/8.

UNDER ROYAL PATRONAGE

HEDGING GLOVES
GARDENING GLOVES
THORNPROOF
PRUNING GLOVES

made from soft and pliable first quality Horsehide in all sizes and as supplied to the Fellows of R.H.S. since 1920.

Write for the New Price List

ADA EVERITT, Gardening Gloves

82b, CONSTABLE ROAD, IPSWICH, Suffolk.

SMAIL'S GARDEN SHOP

Seeds for Garden and Greenhouse
Climbing, Alpine and Hardy Plants
Flowering and Evergreen Shrubs
Gladioli. Lawn Grass Seed.
Fertilisers. Insecticides.
Sankey's Garden Pots

W. SMAIL

44/46, Palmer Street, Westminster, S.W.1
ABBey 4427

One minute from St. James's Park Station
Five minutes from R.H.S. Hall

MAXICROP
LIQUID SEAWEED

THE ALL ORGANIC LIQUID FEED.

IMPROVES THE SOIL, FEEDS THE PLANT.

INCREASES DISEASE RESISTANCE.

Particulars from

MAXICROP LTD.

Holdenby, Northampton

BAMBOO CANES

All per 100	A. Thin. s. d.	B. Med. s. d.	C. Stout. s. d.	D. Ex. Stout. s. d.
12 in.	2 6	3 0	4 0	5 0
18 in.	3 0	4 0	5 0	6 0
2 ft.	4 0	6 0	7 6	10 0
2½ ft.	5 0	7 0	10 0	15 0
3 ft.	7 6	10 0	15 0	20 0
4 ft.	12 6	15 0	25 0	30 0
5 ft.	25 0	30 0	35 0	40 0
6 ft.	30 0	35 0	40 0	45 0
7 ft.	40 0	45 0	50 0	60 0
8 ft.	45 0	50 0	60 0	70 0
10 ft.	50 0	60 0	70 0	80 0

Orders up to £1 add 2s. post. Carriage paid nearest station. C.W.O.

THE BRITISH BAMBOO CANE CO. LTD.
52, LANIVET, BODMIN, CORNWALL
London Showrooms: 52 "The Cornish Jungle," 220 Strand, W.C.2. (Opp.: Law Courts.) CEN. 8195

Our reputation for quality and service is unequalled. *Write for our catalogue of :*

- Begonias
- Delphiniums
- Polyanthus
- Gloxinias
- Cyclamens
- Herbaceous Plants

and test it for youself.

Blackmore & Langdon

of Bath.

PRIZE flowers from your garden

FOR BORDERS ABLAZE!

FORK FISONS **FLOWER FERTILIZER** IN NOW. 4ozs. per sq. yard IS THE RIGHT MEASURE.

BEDDING OUT? PREPARE YOUR GROUND WELL. FEED IT 3ozs. per SQ. YARD OF FISONS **FLOWER FERTILIZER** IN THE TOP SPIT. THAT'LL GIVE YOUR FLOWERS A FLYING START

FREE! Ask your horticultural shop for a free copy of 'Just Made for Your Garden'. It tells you how to use Fisons Garden Fertilizers.

It's Fisons for Fertilizers

Plantoids WILL keep cropping up!

HALF SIZE
150 PLANTOIDS
for **2/-**

STANDARD PACK
300 PLANTOIDS
for **3/6**

GROWER'S PACK
1,000 PLANTOIDS
for **8/-**

ANALYSIS **:—**

Nitrogen	9 %
Potash (K_2O) ..	9 %
Phosphoric Acid	
(Insol.) (P_2O_5) ..	11 %
(Sol.) (P_2O_5) ..	1 %

PLUS

Manganese, Iron, Calcium and Naphthaline

PLANTOIDS REGD.

PLANT GROWTH TABLETS

Distributed for Plantoids by

GRAHAM FARISH LTD, BROMLEY, KENT

Printed by Spottiswoode, Ballantyne & Co. Ltd., London and Colchester.